

UNITED STATES  
COAST AND GEODETIC SURVEY  
T. C. MENDENHALL  
SUPERINTENDENT

# PACIFIC COAST PILOT

## ALASKA

### PART I

*Rare Book*  
*VR*  
*943*  
*.N3*  
*3rd ed.*  
*1891*

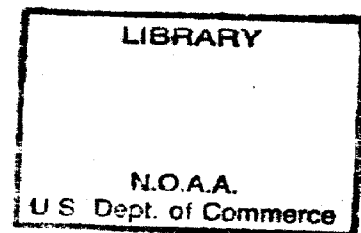
## DIXON ENTRANCE TO YAKUTAT BAY

WITH INLAND PASSAGE FROM STRAIT OF FUCA TO DIXON ENTRANCE.

THIRD EDITION



PRICE ~~\$2.00~~ *\$1.50*



WASHINGTON  
GOVERNMENT PRINTING OFFICE  
1891

# **National Oceanic and Atmospheric Administration**

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## INTRODUCTORY.

The first edition of the Alaska Coast Pilot was issued in 1869. The principal part of the information therein conveyed of the coast features and resources of that territory is from an official report\* by George Davidson, Assistant U. S. Coast Survey, who had charge of the party of the Survey for the geographical reconnaissance in the summer and autumn of 1867. Mr. Davidson also examined the best works of previous explorers and many manuscript maps of the Russian-American Company, and from these and his own observations, compiled the work, which appeared in the form of an octavo volume of two hundred and fifty pages, entitled, "Pacific Coast, Coast Pilot of Alaska, First Part, from Southern Boundary to Cook's Inlet." A general description of the interior route from San Francisco to Alaska by the Strait of Fuca, Gulf of Georgia, and consecutive channels, precedes the description of the coast of Alaska.

Assistant Davidson having been ordered to other important duties, including the direction of a party to observe in Japan the transit of Venus, the compilation of a new work, exhaustive of all known sources of information, was placed by Superintendent Patterson in the hands of William Healey Dall, Assistant Coast and Geodetic Survey, by whom the second edition, as well as Appendix No. 1 on the Meteorology and Bibliography of Alaska, separately published, was compiled.

This compilation includes the coördination and digestion of the following material:

The charts and publications relating to Alaska, catalogued in Appendix No. 1, so far as they were accessible.

Mr. Dall's own observations and notes collected by him during the explorations made by the Scientific Corps of the Western Union Telegraphic Expedition in 1865, 1866, 1867, and 1868.

The records of the U. S. Coast and Geodetic Survey Office, including the results of reconnaissance surveys by Assistant W. H. Dall and party during the seasons 1871, 1872, 1873, 1874, and 1880.

Various notes, sketches, and observations communicated by navigators and others familiar with the coast.

In this compilation Mr. Dall was ably assisted by Mr. Marcus Baker; it was published in 1883, in the form of a quarto volume of 333 pages, under the title "Pacific Coast Pilot, Alaska, Part I, Coast from Dixon Entrance to Yakutat Bay with the Inland Passage."

Much valuable material having accumulated, which it was desirable to prepare for publication, and Mr. Dall and Mr. Baker having both accepted positions in the U. S. Geological Survey, Superintendent Thorn, in 1888, intrusted the preparation of a new edition of the Alaska Coast Pilot to Lieutenant Commander Henry E. Nichols, U. S. N., Assistant Coast and Geodetic Survey, who has compiled the present volume which, in its scope and arrangement, resembles the edition of 1883. It embraces the coast and islands from Dixon Entrance to Yakutat Bay, and the Inland Passage through the Strait of Fuca, Gulf of Georgia, and consecutive channels used by the mail steamers of the United States and other steam-vessels to reach the waters of southeastern Alaska.

The plan includes:

A general description of the coast-line and of the shores of the several harbors and thoroughfares in geographical sequence from South to North.

A description of all known dangers and obstructions to navigation.

Sailing directions for approaching and entering the harbors.

Latitudes and Longitudes of important landmarks, headlands, and special localities.

Views of the coast and of the entrances to the more important harbors; also

A chart brought up to the epoch of 1890, showing the lines of equal magnetic variation over the territory. This chart was prepared by Assistant C. A. Schott, and appears also as an illustration

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\* This report was published as Appendix No. 18 to the Coast Survey Report for 1867.

## INTRODUCTORY.

with the discussion of the data to Appendix No. 11 to the Report of the Superintendent of the U. S. Coast and Geodetic Survey for the year 1889.

The material used in the present compilation includes:

The records of the U. S. Coast and Geodetic Survey Office; the most valuable part being from a hydrographic survey, begun in 1881, which extends over nearly one-half of the navigable waters of southeastern Alaska, namely: Portland Canal, Revillagigedo Channel, Clarence Strait, Sumner Strait, Wrangell Strait, Frederic Sound, Stephens Passage, Seymour Canal, and the bays and harbors connecting therewith.

The two preceding editions of the Alaska Coast Pilot.

The Pacific Coast Pilot, fourth edition, compiled by Assistant Davidson, published in 1889.

Sketches and verbal information from the captains and pilots of the mail steamers plying to Alaska, and from Naval officers who have been stationed there, to which must be added five years' personal experience of the compiler. The views are from the editions of 1869 and 1883, with some more recent ones, by the officers of the Survey.

It is believed that this compilation represents, as nearly as possible, our present knowledge of the subject; that part of it which is derived from the surveys made since the acquisition of the territory by the United States, is alluded to in the text as "surveyed;" that part which is collected from other sources of information of Alaskan waters, is alluded to as "unsurveyed;" the latter will, of necessity, be more or less imperfect; it will be substituted by better information from the hydrographic survey now in progress, as rapidly as practicable.

Absolute accuracy in a work of this kind is generally admitted to be unattainable. Pilots and masters of vessels and other persons interested are earnestly requested to send any new information or corrections to the Superintendent of the U. S. Coast and Geodetic Survey, Washington, D. C.

Part II, embracing the coast and islands to the northward and westward of Yakutat Bay, will be compiled as rapidly as the data is collected, and will be published when sufficient is obtained.

T. C. MENDENHALL

*Superintendent, U. S. Coast and Geodetic Survey.*



### NOTE.

All bearings and courses are *magnetic*.

All distances are in *nautical miles*.

All depths are at *mean low water*, unless otherwise stated.

A cable length is *one-tenth of a nautical mile*.

All longitudes are *west from Greenwich*.

### CHART CATALOGUE.

A catalogue of the charts published by the U. S. Coast and Geodetic Survey will be mailed free of charge to any one applying by letter to the Superintendent of the U. S. Coast and Geodetic Survey, Washington, D. C.

#### AGENCIES ON THE PACIFIC COAST FOR THE SALE OF THE CHARTS, TIDE TABLES, AND COAST PILOTS OF THE UNITED STATES COAST AND GEODETIC SURVEY.

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## TABLE OF SCALE EQUIVALENTS.

The following table gives the lengths of nautical and statute miles on the several scales named, these scales being the proportionate size of the chart to nature. That is, in the scale  $\frac{1}{1,200}$ , the chart is  $\frac{1}{1,200}$  part of the actual linear dimensions in nature, (or 100 feet to the inch,) equal to 60.8 inches to a nautical mile, and 52.8 inches to a statute mile, and so on.

A nautical mile is a minute of an average great circle of the earth, and its length is 6,080 feet, or 1853.2 meters. A statute mile is 5,280 feet, or 1609.3 meters.

SCALE.	NAUTICAL MILE.		STATUTE MILE.	
	Inches.	Centimeters.	Inches.	Centimeters.
$\frac{1}{1,200}$	60.803	154.44	52.800	134.11
$\frac{1}{2,400}$	30.401	77.22	26.400	67.06
$\frac{1}{4,800}$	15.201	38.61	13.200	33.53
$\frac{1}{5,000}$	14.593	37.06	12.672	32.19
$\frac{1}{10,000}$	7.296	18.53	6.336	16.09
$\frac{1}{15,000}$	4.864	12.36	4.224	10.73
$\frac{1}{20,000}$	3.648	9.27	3.168	8.05
$\frac{1}{30,000}$	2.432	6.18	2.112	5.36
$\frac{1}{40,000}$	1.824	4.63	1.584	4.02
$\frac{1}{50,000}$	1.459	3.71	1.267	3.22
$\frac{1}{60,000}$	1.216	3.09	1.056	2.68
$\frac{1}{80,000}$	0.912	2.32	0.792	2.01
$\frac{1}{100,000}$	0.730	1.85	0.634	1.61
$\frac{1}{200,000}$	0.365	0.93	0.317	0.80
$\frac{1}{400,000}$	0.182	0.46	0.158	0.40
$\frac{1}{1,000,000}$	0.073	0.18	0.063	0.16
$\frac{1}{1,200,000}$	0.061	0.15	0.053	0.13

1 meter = 39.3704 inches.  
1 centimeter = 0.3937 "

## ERRATA.

- Page 50. Line 14 from top: *for "Edge" read "Edye."*  
 Page 99. Line 7 from bottom: *for "Mystic" read "Mastic."*  
 Page 115. Line 1 from top: *for "56° 28' 15'" read "56° 27' 16'."*  
 Page 117. Line 6 from top: *for "Woronofski" read "Woronkofski."*  
 Page 117. Line 8 from top: *for "Vauk" read "Vank."*  
 Page 121. Line 24 from top: *for "Klavak" read "Klawak."*  
 Page 173. Line 31 from top: *for "Alentkina" read "Aleutkina."*  
 Page 179. Line 8 from bottom: *for "page 180" read "page 176."*

N. B.—While this volume was in press the spelling of certain geographic names used in it was changed by the U. S. Board on Geographic Names. Wherever it is found that the same name is spelled differently in the first and latter part of this volume, the index should be consulted as the standard.

## ADDENDA.

### TIDES.

	FUNTER BAY.	BARLOW COVE.	FRITZ COVE.
Average time of high water .....	0 <sup>h</sup> 19 <sup>m</sup>	0 <sup>h</sup> 20 <sup>m</sup>	0 <sup>h</sup> 30 <sup>m</sup>
Mean rise and fall .....	16.0 feet	16.4 feet	16.7 feet

### CARMANAH LIGHT AND FOG SIGNAL.

Light flashing white showing three flashes in succession every minute at intervals of 15 seconds, followed by an interval of 30 seconds, during the greater part of which the light is eclipsed. Elevation 173 feet above high water; should be visible at a distance of 19 miles.

Latitude ..... 48° 36' 38'' N.  
 Longitude ..... 124° 46' 30'' W.

Steam fog horn, giving one blast of 6 seconds at intervals of 30 seconds.

[To face page 8.]

# ALASKA COAST PILOT.

## STRAIT OF FUCA TO DIXON ENTRANCE.

In making this passage from the entrance of the Strait of Fuca to the inland waters of Alaska, it will only be necessary, for the purposes of this work, to describe briefly the route used by steamers passing through the waters of the Columbian Archipelago, referring to other sources for more extended information.\*

### NAVIGATION OF THE STRAIT OF FUCA.

The following notes on the navigation of the Strait of Fuca to Victoria, B. C., and Puget Sound, are extracts from the Pacific Coast Pilot, Coast of California, etc., U. S. Coast Survey, edition 1889:

#### THE FLATTERY ROCKS.

This is the most marked group of rocky islets north of the Farallones off San Francisco Bay. Although they do not extend far off shore, yet they are the westernmost land of the United States S. of Alaska. They are in the direct route of all vessels bound to and from the Strait of Fuca, whether to ports in Puget Sound or to Victoria and the Gulf of Georgia.

The whole group comprises a line of rocks and islets parallel with the coast, beginning  $3\frac{1}{2}$  miles S. of Cape Alava, and reaching  $2\frac{1}{2}$  miles beyond it. The southern rocks are about  $\frac{1}{2}$  mile off shore, but the extreme NW. extension is the low cluster of the Umatilla Reef exactly west from the cape.

**Osett Island.**—This is the largest islet of the Flattery group; it is  $\frac{1}{2}$  mile long W NW. and E SE., and about  $\frac{1}{2}$  mile broad. It has very steep, rocky sides, broken down somewhat on the S. face, but the full height of the island is to the westward. It appears nearly flat-topped and is 240 feet above the sea, with irregular clustering of trees alive and burnt. The largest clump of trees is near the SE. end. The outer or western end of the island is  $1\frac{1}{2}$  miles SW. by S. from the north part of Cape Alava. On the S. and SE. face there are low-lying black rocks  $\frac{1}{2}$  mile from the islet; inside of it the rocks from the cape reach within  $\frac{1}{2}$  mile, or half-way toward it. The Indian name of the island is Osett.

**Bod-el-teh Islets.**—These are the two large and highest outlying islets of the Flattery group, being farther out than Osett Island. The outer islet is somewhat the larger, being 325 yards long E. and W. and 175 broad. The inner one is only 120 yards from it toward the cape, and is 270 yards long E. and W., and 165 yards broad. These islets have high, bold, and bare rocky ocean fronts, with gradually sloping surfaces toward the shore. The front of the outer islet is 250 feet high and of the inner 230 feet. Both are covered with Oregon pine, and on the lower parts by ferns and bushes. Close under the SW. angle of the outer islet there is a high, bare rock separated from the islet by a very narrow waterway; 200 yards outside the outer islet is a small rock about 50 yards in extent, but rising to 175 feet elevation. Two smaller rocks are outside of this one to the west, low and black, and one to the north somewhat higher. Between these islets and the cape the water appears deep for  $\frac{1}{2}$  mile and then the rocks, which are very numerous, reach to the shore-line of the cape.

The outer end of this larger islet is  $1\frac{1}{2}$  mile W.  $\frac{1}{2}$  S. from the N. point of the Cape Alava.

The geographical position of the western point of this outer islet, as determined by the U. S. Coast and Geodetic Survey, is:

Latitude .....	44° 10' 24" N.
Longitude .....	124° 46' 10" W.

**The Umatilla Reef.**—In some respects this is the greatest danger on the northern coast, because in thick weather it is a very difficult object to make out, and in the heavy gales and long, stormy

\* For more extended information the navigator should consult the Pacific Coast Pilot, Coast of California, etc. by U. S. Coast Survey, edition 1889. Also Coast Survey Chart No. 684.

nights of winter a vessel approaching it from the southward has probably had no departure since passing Cape Orford light-house. The extent of this reef is 220 yards **E.** and **W.** and about 75 yards wide.

It shows one low black rocky head about 60 yards in extent, and three other very small ones, together with three points of breaks, one being close on the inner side of the visible rocks. The outer edge of the reef lies 1 mile and 100 yards **W.**  $\frac{1}{2}$  **N.** from the outer limit of the westernmost Flattery rock or islet, and there is a passage way of  $\frac{1}{2}$  mile wide between the reef and the outlying low black rock off that islet. Through this passage the Coast Survey steamer passed in the reconnaissance of 1852, with soundings of 29, 10, and 20 fathoms, keeping nearer the inner islet, but the irregularities of the depths show clearly the foul character of the bottom. One mile outside of the Umatilla Reef there is a sounding in 27 fathoms, fine sandy bottom. This reef lies  $12\frac{1}{2}$  miles **S.** by **E.**  $\frac{1}{2}$  **E.** from Tatoosh Island light-house.

There are no known dangers to the westward of it, and none to the northward of it for 4 miles.

Steamships bound northward to the Strait of Fuca, or southward therefrom, lay a course to pass 4 or 5 miles to the westward of Umatilla Reef, although there are no known hidden dangers outside of it.

**Umatilla Reef—Whistling buoy.**—A second-class whistling buoy, painted red and lettered "*Umatilla Reef*" in white, has been established off the Umatilla Reef. It is moored in  $24\frac{1}{2}$  fathoms of water.

From the buoy the following bearings and distances are given to prominent objects:

Cape Flattery light-house .....	N. $\frac{1}{2}$ W., 13 miles.
Umatilla Reef .....	NE. by E. $\frac{1}{2}$ E., $1\frac{1}{2}$ miles.
Osett Island, S. side .....	E. $\frac{1}{2}$ S.
And the nearest part of the island is distant .....	$3\frac{1}{2}$ miles.
Carroll Island .....	SE., $11\frac{1}{2}$ miles.

**Osett River.**—This is a small stream opening  $1\frac{1}{2}$  miles **N NE.** from Cape Alava, where the rough, rocky shores break down and a sand and boulder low-water beach commences. The valley is moderately wide but heavily wooded like the rest of the country.

#### FROM FLATTERY ROCKS TO CAPE FLATTERY.

From Cape Alava the coast-line continues nearly **N.** for  $4\frac{1}{2}$  miles, and then falls to the eastward 3 miles to form Mukkaw Bay, whence it runs out well to the westward as far as Cape Flattery. The shore-line is irregular, with alternate stretches of wooded bluffs and rough, rocky cliffs from 100 to 200 feet high. The country immediately behind the shore is not high, but after a few miles the hills ascend sharply toward the **E.**, and are heavily wooded with pine and hemlock, and are almost impenetrable on account of the dense underbrush.

**The Point of Arches.**—From Cape Alava the first 3 miles of the shore is a somewhat irregular wooded bluff rising to over 100 feet. It is bordered by good low-water and high-water beaches, both narrow, and the former interrupted. At  $4\frac{1}{2}$  miles **N.**  $\frac{2}{3}$  **W.** from the high islet at the northern limit of the cape the shore-line is broken by high, bold, rocky cliffs for  $1\frac{1}{2}$  miles.

The forest reaches to the edge of the cliffs. At their bases there is neither low nor high water beach, but many high rocks and islets are closely clustered around them. Some of these stretch out  $\frac{3}{4}$  mile. The southern one is the *Father and Son*; the former is the outside part and rises to 163 feet; the smaller part, connected by a low black reef, is 66 feet on the eastern edge. They lie  $\frac{1}{2}$  mile off the nearest cliffs, and are  $3\frac{3}{4}$  miles **N.**  $\frac{1}{2}$  **W.** from the northern point of the cape. There are no known hidden dangers around them. One mile **NNW.** from these rocks is a rock 40 feet high, nearly  $\frac{1}{2}$  mile off the cliffs, with a dozen rocks between it and the shore. *Spike Rock*, which has sometimes been called Sail Rock, is the northernmost of these rocks off the Point of Arches. It is a small, sharp, bare rock 42 feet high, standing  $\frac{7}{8}$  mile **W.**  $\frac{1}{2}$  **N.** from the point. Between it and the point are 3 large, high, rocky islets; the first reaches to 164 feet elevation, is grassy-topped, and marked by a pinnacle 108 feet high on the inner side; the second is grass-covered on top and reaches 170 feet above the sea; the third is 152 feet high, and has grass and a few pines upon it. There are three arches in these islets. One-third of a mile **SW.**  $\frac{2}{3}$  **S.** from Spike Rock there is a rock, *awash* at low water. This danger is 1 mile off shore and  $4\frac{1}{2}$  miles **N.**  $\frac{1}{2}$  **W.** from Umatilla Reef. It is well inside the course of all vessels.

Half a mile **N.** of the westernmost part of this point there is a very small head at the extremity of a narrow point separating the bare cliffs on the **S.** from the wooded bluff on the **N.**; through this narrow point there are two arches.

The westernmost part of this cape lies  $9\frac{1}{2}$  miles **SE.** by **S.** from Tatoosh Island light-house, and it is in

Latitude .....	$48^{\circ} 14' 10''$ <b>N.</b>
Longitude .....	$124^{\circ} 42' 33''$ <b>W.</b>

**Portage Head.**—For nearly 2 miles to the northward of the Point of Arches the shore-line is a wooded bluff over 100 feet high. It curves to the eastward slightly and has a fine low-water beach

and a narrow high-water beach to the commencement of the irregular rocky cliffs of Portage Head. These cliffs are bold, irregular, over 100 feet high, and covered with wood. The head has a little over 1 mile frontage, and runs nearly **N NW.** and **S SE.** The extreme northern part of the head is formed by 2 high tongues, with steep sides and fern-covered tops.

The boldest part of the head lies exactly **N.** from the outer high Flattery rock at a distance of  $7\frac{3}{4}$  miles. It is nearly  $6\frac{3}{4}$  miles **SE.**  $\frac{1}{4}$  **E.** from Tatoosh Island light-house.

**Dangers.**—Off the **N.** end of the point and stretching nearly  $1\frac{1}{2}$  miles toward Tatoosh Island light-house there are several low, black rocks awash at low water, some sunken, and a small one 44 feet high.

**Mukkaw Bay.**—The **SE.** point of this bay is Portage Head; the **NW.** point is Wa-atch Point. The westernmost parts of these points lie **NW.** by **N.** and **SE.** by **S.** from each other, 3 miles apart; **E.** from this line the depth of the bay is  $1\frac{1}{4}$  miles. The southern half of the bay has numerous rocks, low and sunken, reaching out  $1\frac{1}{2}$  miles **NW.** from Portage Head, and therefore the approaches are dangerous. The innermost rock is 44 feet above water.

The water in the bay is not very deep, but vessels can anchor in northerly and easterly weather with safety, provided there is not too much sea.

The southern part of the bay is bordered by a long, broad, low-water beach, and a low, sandy, high-water beach which forms a long, narrow peninsula to the mouth of the Tsoo-e-z River, which comes in from the southeastward. This peninsula is sandy on the outside and grassy on the river side; the narrowest part is only 50 yards across, but it widens to the northward, and reaches out to a small, rocky head with numerous low, black rocks for  $\frac{1}{4}$  mile outside; near this narrow part of the peninsula and under the **N.** end of a forty-foot cliff are three Indian houses. At the mouth of the river there is a short piece of cliff 60 feet high, and the **S.** side is a broad, sandy point, with a few pines upon it. The width of the river is 80 yards, but decreases to 50 yards behind the Indian houses. It has a swift current and it cannot be forded at the mouth, but can be about 1 mile above, at extreme low tides.

There is a very broad, sandy, low-water beach off the **S.** point at the entrance.

#### THE COAST-LINE.

From Point Greenville to Cape Flattery the country bordering the coast is moderately low and densely wooded, but within 10 miles the hills begin to merge into the flanking high mountains of the Olympus Range. All the hills are covered with forests, and on account of the underbrush the country is nearly impassable.

#### LANDFALLS.

In approaching the coast just northward of Cape Disappointment there is a long range of high hills visible about 30 miles from seaward, and made out long before Cape Disappointment is raised. The position of the culminating part of this range is not yet accurately laid down. It lies eastward of Shoalwater Bay and northeastward of Cape Disappointment.

**Mount Olympus.**—From Gray's Harbor to Cape Flattery the most prominent landfall is the mountain mass of Olympus, occupying the greater part of the great peninsula of Washington, between Hood's Canal, the Fuca Strait, and the ocean toward Gray's Harbor. Overhanging Hood's Canal it reaches 7,777 feet elevation at Mount Constance, and toward the west it falls only to 4,000 feet within 20 miles **E SE.** of Tatoosh Island light-house.

The numerous high mountains are massed over a large area, with the culminating peaks probably 50 miles **E.**  $\frac{1}{2}$  **S.** from the Flattery Rocks and 35 miles **N NE.** from Cape Elizabeth.

In 8 months of the year this great landfall is covered with snow, which lies in the gorges and valleys nearly the whole summer. It attains an elevation of about 8,200 feet.

One of the western outlying peaks of this range, of 4,000 feet elevation, lies 20 miles **E.** by **S.**  $\frac{3}{4}$  **S.** from Tatoosh Island light-house. It therefore lies 14 miles **E.** by **N.**  $\frac{1}{2}$  **N.** from Flattery Rocks, and 20 miles **N.** by **E.** from the Quillihute River.

#### THE ENTRANCE TO THE STRAIT OF JUAN DE FUCA.

##### TATOOSH ISLAND.

This island is the northwesternmost land of Washington and lies off the **SW.** point of the entrance to the Strait of Juan de Fuca. It is  $\frac{1}{2}$  a mile **W NW.** from the nearest part of Cape Flattery. There is one main islet nearly  $\frac{1}{4}$  mile in extent, and 3 small ones and several reefs awash close on the **W NW.** face. It is nearly flat-topped and without trees, but is now distinguished by the light-house buildings upon it. The surface is 108 feet above high water, and the sides are nearly vertical. A reef extends  $\frac{1}{4}$  mile off the westward side of the islet, and the whole extent of the islets and reefs is only  $\frac{1}{2}$  mile in length **W NW.** by  $\frac{1}{2}$  mile in width. Deep water is found upon all sides, except between the islet and the cape, where a reef exists upon which the swell breaks heavily in bad weather. We have been informed that small vessels have gone through this passage when jammed by an unfavorable wind. In so doing great risk must have been incurred, as the currents in the vicinity run very irregular and strong. When approached from the southward this passage looks as wide as the extent of the island.

## TATOOSH ISLAND.

**The Fuca Pillar.**—From Tatoosh Island a leaning rocky column 140 feet high and 50 feet in diameter is seen,  $\frac{1}{10}$  mile S E.  $\frac{1}{2}$  E. from the light-house, and only 120 yards from the cliffs, which are 120 feet high. It is just  $\frac{1}{2}$  mile S S E. from the westernmost point of the cape. It shows well when a vessel is approaching Tatoosh Island from the northwestward, and is last seen from the Strait of Fuca when the face of the cape is just open by the eastern tangent of Tatoosh Island. At that time the pillar fills one-third of the apparent gap, and the top leans half its breadth to seaward. It is seen just over the island and only disappears when it bears S E.  $\frac{1}{2}$  E. over the extreme western reef of Tatoosh Island. It is a trifle higher than the black rocky cliff just northward of it.

It bears to the northwest; is 60 feet diameter at the base, decreases to a few yards at the top, which is covered with low stunted bushes and grass, and is inaccessible, except on the southeast side.

## THE TATOOSH ISLAND LIGHT-HOUSE, CAPE FLATTERY.

This structure is erected on the highest part of the island toward its northwestern part.

The light-house is just 90 yards S E. from the extreme western point of the main islet, and 25 yards in from the edge of the cliff, which is here 97 feet above the sea.

It consists of a keeper's dwelling of gray sandstone, with a tower of brick, whitewashed, rising above it, and surmounted by a balustrade and an iron lantern painted black. The tower is the frustum of a cone. The light shows a *fixed white light (with red ray)* of the first order.

It illuminates  $264^\circ$  of the horizon and the limits of the arc of visibility extend from S.  $16^\circ$  E. round by the S., W., and N. to N.  $68^\circ$  E., including Vancouver Island. To the southward this limit passes tangent to Flattery Rocks, and a vessel will see it faintly or lose it before going ashore. Into the strait it passes nearly tangent between Tatoosh Island and Neéah Bay. The height of the focal plane is 64 feet above the base of the tower and 162 feet above the mean level of the sea.

A red ray has been introduced into the white light to cover the position and approaches to Duncan and Duntze Rocks. These dangers lie in the axis or middle of this red ray, which embraces  $7^\circ 15'$ , approximately, between its outer limits. It subtends the arc from N.  $31^\circ$  W. to N.  $38^\circ$  W. The white ray is not seen in the space covered by the red ray.

Duncan's Rock is 1 mile from the light-house and Duntze Rock  $1\frac{1}{2}$  miles.

When the atmosphere is thick or smoky the red ray will not penetrate to a long distance seaward, and vessels must, therefore, be prepared for this condition and its consequences.

In clear weather the light should be seen from a height of 15 feet, 19 miles, so that a vessel from the southward should make it 10 miles before making the Flattery Rocks.

The geographical position of the light-house, as determined by the U. S. Coast and Geodetic Survey, is:

Latitude .....	$48^\circ 23' 15''.5$ N.
Longitude .....	$124^\circ 44' 55''.21$ W.

In January, 1855, the magnetic variation was  $23^\circ 00'$  east, and had a yearly increase of  $0'.4$ , but the easterly variation has nearly reached its greatest range.

There are other buildings on the island connected with the light-house; one is 25 yards to the N E. This light is also known as the Cape Flattery light-house.

## STEAM FOG-SIGNAL ON TATOOSH ISLAND.

About 30 yards to the northwestward of the light-house is the building containing the steam fog-signal. The sounding apparatus is a twelve-inch steam-whistle, which is sounded during thick and foggy weather every minute; the blasts are 8 seconds long and the intervals 52 seconds.

From Tatoosh Island light-house we have the following bearings and distances to important objects:

Cape Orford light-house .....	S S E., 333 miles.
Umatilla Reef, off the Flattery Rocks .....	S. by E. $\frac{1}{2}$ E., 12 $\frac{1}{2}$ miles.
Cape Beale light-house, Barclay Sound, Vancouver Island .....	N W. by W. $\frac{1}{2}$ W., 30 $\frac{1}{2}$ miles.
Point Bonilla, Vancouver Island .....	N N W., 12 $\frac{1}{2}$ miles.
Owen Point, Port San Juan, Vancouver Island .....	N N E., 13 miles.

A telegraph line has been established between Port Townsend and Tatoosh Island via Port Angeles. From the island weather reports are sent to all places on Puget Sound for the information of ship-masters.

**Duncan Rock.**—This is a small, low, black rock, rising above the highest tides, but always washed by the western swell which breaks over it. Deep water is found close around it.

The rock is 1 mile N W.  $\frac{1}{2}$  N. from Tatoosh Island light-house; it is in the red ray shown from the light-house.

Many vessels pass between this rock and Tatoosh Island, as the chart shows 25 fathoms in the passage; but a rock has been reported in the channel, and it would be well to avoid it until the doubt is set at rest.

In 1878 a *sunken rock* was reported lying 250 to 300 yards E. from Duncan Rock, with a depth of  $3\frac{1}{2}$  fathoms of water over it at half tide. It was fished upon.

**Duntze Rock.**—Nearly  $\frac{1}{4}$  mile off Duncan Rock, on the line from Tatoosh Island, Kellett places a rock having 3 fathoms of water upon it, and to which he gave this name; in heavy weather the swell breaks upon it. There is deep water all around it.

It is  $1\frac{1}{2}$  miles NW.  $\frac{1}{8}$  N. from Tatoosh Island light-house, and is in the red ray shown from the light.

With no wind, a heavy swell from the W., ebb current, and proximity to these outlying rocks and the island, a vessel's position is unsafe, and great caution should be exercised in navigating this part of the entrance to the Strait of Fuca.

## CAPE FLATTERY.

The extent of ocean shore-line from Cape Disappointment to Cape Flattery is 143 miles. This cape forms the southern head of the entrance of the Strait of Juan de Fuca. It has a bold, wide, jagged sea-face a little more than 1 mile in length N NW. and S SE., and about 120 feet high; the rocky cliffs are much disintegrated by the wearing action of the ocean; the summit rises in 1 mile to an irregular mountain of 1,500 or 2,000 feet elevation, and its flanks are cut up by gorges and covered with a dense growth of Oregon pine and almost impenetrable underbrush from the edge of the cliffs to the summit. For  $\frac{1}{8}$  mile S SE. of Fuca Pillar there are 4 outlying rocky masses, ranging from 41 to 80 feet in height, and reaching  $\frac{3}{8}$  mile from the cliffs. The whole line of cliffs is bordered by low black rocks, as well as some higher masses that are close under the shore.

Fuca Pillar or Pinnacle Rock has already been mentioned as lying close under its southern point. When seen from the southwestward the mountain mass of Cape Flattery is raised as an island on account of the marshy valley of the Wa-atch running behind it from the ocean at Mukkaw Bay to Neéah Bay.

When a vessel is 40 miles S SE. from Cape Flattery, the mountain is seen somewhat faintly outside the lower and darker outline of Cape Alava. A short distance outside of the cape there is the square Carroll Islet, distant 17 miles, in latitude  $48^{\circ} 00\frac{1}{4}'$ , with a part of Jagged Islet just seaward of it. From this rock stretch eastward the high faintly seen mountains of Vancouver Island.

As the cape is approached Cape Flattery rises; and when a vessel is S SW. from the mouth of the Quillibute River, the general low-wooded line of the coast stretches with decreasing height nearly round to N NW. Over this low outline are slightly higher and more distant wooded hills. When Cape Flattery bears N. by W.  $\frac{1}{2}$  W. at 33 miles distance, Flattery Rocks, 21 miles distant, are just lifted on the horizon outside the limit of Cape Flattery, which shows as faintly rolling high land, under which is the comparatively low point of Cape Alava behind Flattery Rocks. Prominent on the horizon and just under the summit of the cape is the high square Carroll Islet with two lower and smaller rocks just outside. A short distance inside of this is seen Cake Rock, long, moderately low, with a mound in the middle, and black.

From the northernmost part of the cape the general direction of the shore-line running into the Strait of Fuca is E NE.  $\frac{1}{2}$  E. for 4 miles to Neéah Bay, and thence the southern shore follows the general direction of the Strait of Fuca to the eastward.

The immediate shore-line round to Neéah Bay is of the same forbidding character as the ocean front; it is bordered by jutting rocky points and reefs for  $3\frac{1}{2}$  miles, and has but one short stretch of beach  $\frac{1}{4}$  mile long, backed by high, wooded hillsides. This short beach is  $2\frac{1}{2}$  miles inside of Tatoosh Island, faces to the NW., and just behind it is the stockaded village of Clisseet, now used as the summer house of the Mukkawes.

Under the shores of Cape Flattery and the shore to Neéah Bay, the depth of water ranges from 10 fathoms at  $\frac{1}{4}$  mile outside the shore-reef, to 40 and 60 fathoms at 1 mile from shore. There is not much kelp about the cape, because it is torn away by the heavy swell, but straggling kelp is found near Clisseet village, and in larger mass around Koitlah Point.

The currents are very strong around the cape, reaching as much as 3 miles per hour along the shore; they set irregularly round the cape, Tatoosh Island, and Duncan Rock. Heavy current rips are seen between the island and the cape and hence toward Neéah Bay.

## REPORTED BANK OFF CAPE FLATTERY.

There has been no exhaustive hydrographic survey of the approaches to the entrance of the Strait of Fuca. The hydrography, so far as executed by the British and American surveyors, indicates the existence of extensive banks, but no depth of less than 33 fathoms is given. The submarine valley of the Strait of Fuca is barred abruptly at the NW. side at the entrance, and seems to run sharply around and outside Tatoosh Island to the S SW. for a few miles.

Notwithstanding these published results, several navigators have reported less depths of water, and it seems only prudent to briefly refer to them. Fifteen miles by estimation and W NW. from Cape Flattery, it is reported that a bank exists having 18 fathoms upon it. The chart gives 38 fathoms in this vicinity. In 1864 a vessel reported having anchored for 22 hours during thick weather in 12 fathoms over a bottom of gray sand and black specks. Upon the weather clearing up she was W SW. from Cape Flattery, and could just see the top of Tatoosh Island. This would place her 15 or 16



miles from the island. In her supposed position the chart gives 60 to 90 fathoms. In July, 1865, the schooner *Brant*, of Victoria, discovered cod-fishing banks off Cape Flattery and caught five barrels of cod after two hours' fishing. The fish are known as red cod and weigh from five to fifteen pounds each. The bank has soundings in 25 fathoms, and is 16 miles nearly due west from Cape Flattery. This location has no authentic soundings. In 1867 an examination was made, by the U. S. Coast Survey brig *Fawcett*, of halibut banks in 50 fathoms of water off the SW. coast of Vancouver.

About latitude  $48^{\circ} 35'$ , and 75 miles W. by S. from Tatoosh Island, La Pérouse sounded over a bank having 35 fathoms and a pebbly bottom. On a line about 20 miles N. by E. from that point he got 42, 45, 65, 75, and 34 fathoms; thence SE. he increased his depth to 90 fathoms in about 7 miles. The weather was foggy and he had no observations for position. This is, doubtless, the bank lying 35 to 45 miles west from Cape Flattery, and making out from Barclay Sound. The English chart, No. 1917, exhibits this bank, to which I have applied the name La Pérouse. The general chart gives a fair representation of the depth of water off the entrance to the Strait of Fuca, and indicates the deep submarine valley parallel with the coast a short distance south of Cape Flattery, but the following figures are instructive:

On a general direction of SW.  $\frac{1}{2}$  W. from Tatoosh Island light-house there are the following depths of water at the given distances: At 4 miles, 34 fathoms; at 9 miles, 108 fathoms, over muddy bottom; at 17 miles, 72 fathoms; at 25 miles, 58 fathoms; at 30 miles, 72 fathoms, over mud; at 37 miles, 93 fathoms; and at 43 miles, 176 fathoms, over muddy bottom. It is very evident that the marginal plateau of the seaboard extends well out from the coast line in this latitude.

#### STRAIT OF JUAN DE FUCA.

The entrance to this strait from the Pacific Ocean lies between Cape Flattery on the Washington side and Cape Bonilla on Vancouver Island, which forms the northern shore. Its width is about 12 miles, and the bearing from Tatoosh Island to Cape Bonilla is N. by W.  $\frac{1}{2}$  W. From this line the strait runs E. for 45 miles, with a uniform width of 11 miles. It gradually contracts to 8 miles, between Beechey Head on the N. and Striped Peak on the S., maintains the same direction and width for  $5\frac{1}{2}$  miles farther between Race Rocks and Point Angeles; then changes its direction to NE. by E. for 32 miles to the western shore of Whidbey Island. East of Race Rocks it expands to the northward to a width of 18 to 20 miles, and divides into two ship channels, the Canal de Haro and Rosario Strait, both leading through Washington Sound northward to the Gulf of Georgia. It is terminated on the E. by Whidbey Island; \* at the SE. it passes into Admiralty Inlet and Puget Sound, and is bounded on the south by the mainland of Washington, which forms the entire southern shore of the strait. From the ocean to Whidbey Island the mid-channel distance is 83 miles. The depth of water throughout the strait is remarkably great, no bottom being found in its deepest parts with 150 fathoms of line, and the 10 fathom line is close under the shores. It is the main artery for the waters of Admiralty Inlet, Puget Sound, Possession Sound, Hood's Canal, Canal de Haro, Rosario Strait, Bellingham Bay, and the vast Gulf of Georgia, extending between Vancouver Island and British Columbia, for 120 miles, with an average width of 20 miles. The currents run with an average velocity of not less than 3 miles per hour, and off the Race Islands and Beechey Head over 6 miles an hour. The shores are bold, abrupt, and covered with a heavy growth of varied timber and dense underbrush. On the N. side the mountains rise rapidly from the water, and many attain an elevation of not less than 5,000 or 6,000 feet. These are covered with fir and spruce nearly to their summits. On the S. side for 30 miles from the entrance the shore is bounded by hills from 1,000 to 2,000 feet in height, backed by the jagged Olympus range of more than 8,200 feet elevation. For the next 50 miles the shore is generally a steep cliff, from 50 to 200 feet high, with a flat and densely wooded country extending nearly to the foothills of Olympus and stretching farther S. as we move eastward. When passing through the strait the great Olympus range, when clear and dark, looks as if it overhung the lower line of wooded land forming the S. shores. This lower line, at 10 miles distance, loses its distinctive features except where such deep breaks as Port Discovery, Squim Bay, etc., break the continuity, and when there is sufficient haze or smoke inside to give relief to the points at their entrances. There is a great depression in the first part of the range S. of Port Angeles. The flanks of Olympus to the northward are generally chaparral covered well up to the summits of 4,000 or 5,000 feet. Inside of these flanking spurs the peaks of very nearly even height are wild, sharp-peaked, and broken, with low angle slopes giving an idea of massiveness. At the eastern limit of the strait the western face of Whidbey Island is very steep; it is about 250 feet high, and appears flat, as does the whole country eastward to the dark, sharp-cut outline of the Cascade range, stretching its serrated ridge northward, where the snow peak of Mount Baker † is distinctly seen, and to the southward, where the higher snow peak of Mount Rainier ‡ attracts the eye.

\* That part of the Strait of Fuca east of Race Rocks to Whidbey Island, and all of Washington Sound, forms part of the "Gulf of Georgia" on Vancouver's general chart, and, on the detailed chart, the "Gulph of Georgia."

† Named Montaña del Carmelo by Galiano and Valdez in 1792. Named by Vancouver in 1792.

‡ Named by Vancouver in 1792. Humboldt calls this Mount Rognier, depending upon the narrative of Frémont, who saw it in active operation November 13, 1843. It attains an elevation of 14,444 feet, and is flanked by living glaciers first encountered and published in 1857. There are craters at the summit, and hot gases escaping.

During dry summers the Indians and settlers set fire to the forests in every direction, and the country soon becomes enveloped in a vast smoke that lasts for two or three months. At such times it is frequently impossible to make out the shore at  $\frac{1}{2}$  mile distance. The strong westerly winds coming up the strait disperse it for awhile, but only to fan the fires and give them renewed force and activity. Visitors to the high mountains report this smoke as being from 6,000 to 8,000 feet deep.

*Fogs.*—The fogs in the Strait of Fuca are heaviest near the entrance, and decrease in frequency and density up the strait. At the entrance to the strait the fog from the ocean sometimes stands like a wall, and vessels entering the strait run out of it into clear, bright weather even before they pass Tatoosh Island. The wind, however, gradually works it in, and it will follow the northern shore past San Juan Harbor to the Sombrio River. Less frequently it reaches nearly to Sooke Inlet, and at times envelops the Race Islands. As a rule it may be said that the fog is more likely to follow farther into the strait along the southern shore, reaching as far as Port Townsend, when the northern part of this wide part of the strait is free.

The foggiest months are July, August, and September. The summer season in this latitude is frequently very rainy, and for the year the rainfall at the entrance to the strait has reached 132 inches.

*Winds and rain.*—In summer the prevailing wind draws into the strait, increasing toward evening, and frequently blowing a ten-knot breeze before midnight; but unless the wind is strong outside little is felt in the strait, and frequently sailing vessels may be a week from Cape Flattery to Admiralty Inlet, or *vice versa*. In winter the **SE.** winds draw directly out and create a very heavy cross-sea off the entrance, the great **SW.** swell meeting that rolling out. In such cases sailing vessels try to gain Ne'eah Bay or San Juan Harbor, and remain at anchor until the wind changes. In beating in or out vessels may run as close under either shore as wind and currents warrant, as no hidden dangers have been found  $\frac{1}{2}$  mile off shore, except at the **W.** side of the small indentation called Crescent Bay, near Striped Peak, 44 miles inside of Rock Duncan.

In winter the weather off the entrance to the strait is particularly severe, and the swell is very heavy and irregular. We have encountered a seven-days' gale here with a barometer down to 29 inches and heavy downpours of rain. At one time we were in the center of a cyclonic storm. The rainfall at the station of Ne'eah Bay has reached 132 inches in a year, the greater part falling in the winter. For four years ending in 1887 the average was 95 inches of rain. The months of December, January, February, and March are marked by the greatest averages. Many lumber-laden vessels have foundered off the straits in winter storms. The heavy broken seas are doubtless owing to the shoaling off the entrance, the irregular and very strong currents, and the drawing out of the wind from the strait conflicting with the wind along the outer coast.

*Currents.*—At the entrance to the strait the currents acquire, during the "large tide" of each day, a velocity of 4 miles per hour; and after strong **NW.** winds a very large, short, but regular swell is encountered **W.** of Ne'eah Bay during the ebb current. If the wind be light and no steerageway on the vessel, the feeling is decidedly disagreeable, especially as the current seems constantly to set close around Rock Duncan and Tatoosh Island. If a vessel falls into the trough of this swell she is bound to fetch away something.

We know not where to point to such a ramification of inland navigation as exists from Cape Flattery to the head of Puget Sound and through Washington Sound, save in the British possessions to the northward. For depth of water, boldness of approach, freedom from hidden dangers, and the immeasurable sea of gigantic forest trees coming down to the very shores, these waters are unsurpassed. Washington has a summer and fall climate excelled only by that of California. The shores of Fuca Strait have been gradually settled by immigration coming from Puget Sound and Admiralty Inlet.

#### THE SOUTHERN SHORE OF THE STRAIT OF JUAN DE FUCA.

##### NEE'AH BAY.

Koiltah Point, the western boundary of this bay, is  $3\frac{3}{4}$  miles **E NE.  $\frac{1}{4}$  E.** from the light-house on Tatoosh Island. From Cape Flattery the shore is nearly straight, with short, rocky, jagged points, high and rugged, backed by hills about 1,500 to 2,000 feet high, and covered with fir trees to the cliffs. Reefs lie along the shore from  $\frac{1}{2}$  to  $\frac{1}{4}$  mile out, except at Clisseet's Village, 1 mile west of Koiltah Point. Deep water is found within  $\frac{1}{2}$  mile of the cliffs, and at a distance of  $\frac{1}{2}$  mile a depth of 20 fathoms is obtained.

The bay is about  $1\frac{1}{2}$  miles deep to the **S SE.**, and the same in width at the entrance. The western side is high, precipitous, and bordered by craggy, outcropping rocks, 300 or 400 yards from the shore. The three-fathom line ranges about 600 yards from the foot of the cliff. The general direction of this side is **SE.** for 1 mile, when the hills suddenly cease and a low shore, with sand beach backed by woods, curves gradually to the **NE.** by **E.** for  $1\frac{1}{2}$  miles to Ba-ad'-dah Point, formed by a spur of the hills.

The eastern side of the bay is formed by Wa-ad'-dah Island, the northern end of which lies  $1\frac{1}{2}$  miles **E NE.  $\frac{1}{4}$  E.** from Koiltah Point. This island is a narrow, high ridge, about 250 yards wide and  $\frac{1}{2}$  mile long, covered with trees, and having a direction **SE.  $\frac{1}{4}$  E.**, pointing toward Ba-ad'-dah Point,

and presenting the appearance of a continuation of that spur, but separated from it by a four-fathom channel 500 yards wide. Off the southwest part rocks extend for 250 yards, and the three-fathom line is 600 yards distant. Along the sand beach of the main shore of the bay the three-fathom line is within 200 yards of the shore, the depth increasing to 7 fathoms, then decreasing to 5 in the middle of the bay, and again increasing to 10 on the outer line of the bay. Much kelp abounds in this harbor, even in deep water, but it is especially thick around Koitlah Point, and thence along the western shore of the bay to the deepest part thereof. It also abounds on the SW. face of Wa-ad'-dah Island and around into the narrow channel between it and Ba-ad'-dah. Half a mile E. from Ba-ad'-dah Point there is another large patch of kelp. This kelp is altogether different from that found in the Santa Barbara channel. It is a long, thin, hollow, flexible stem, rising from great depths, and expanding rapidly near the surface of the water to a large hollow bulb, from which float leaves that are 5 or 6 inches wide and 10 feet long.

Outside of the line joining Koitlah Point and Wa-ad'-dah Island, the depth of water increases rapidly from 10 and 11 fathoms to 20 fathoms in  $\frac{1}{2}$  mile.

The best anchorage is in the south part of the harbor, in about 5 or 6 fathoms of water, off the small stream which comes in where the sand beach meets the hills on the west. There was formerly an Indian village at the W. side of the stream, but it is now farther to the eastward, with straggling Indian houses along the beach to the Indian reservation on Ba-ad'-dah Point. There is abundance of water at that stream. During southerly weather little swell is felt here, and the wind can do no harm; but when a large westerly swell is coming up the strait it reaches here, and a vessel rolls uncomfortably unless she rides head to it.

The low ground abreast of the anchorage, and but 200 or 300 yards from the beach, is the head of the Wa-atch Slough, a small stream that runs through the low prairie lands behind Cape Flattery, and empties into Mukkaw Bay south of the cape, near the winter village of the Mukkaws, called Wa-atch. This stream is frequently used by them in winter, when they cannot take their canoes outside the cape.

The white buildings of the Indian reservation are a marked object in approaching the harbor from the eastward. Small vessels coming from the eastward through this passage with the current running into the bay have not much room to round-to for anchorage. The passage is only 400 yards wide between the three-fathom curves. The boat-landing is not good if there is any swell on.

The primary astronomical station of the Coast Survey was just back of the beach, about 400 yards E. of the small stream, on the southwestern part of the bay. From the NW. end of Wa-ad'-dah Island it bears S. by W.  $\frac{1}{2}$  W., distant  $1\frac{1}{2}$  miles.

Its geographical position is:

Latitude .....	48° 21' 48".8 N.
Longitude .....	124° 37' 12".0 W.

The magnetic variation was 23° 00' east, January 1, 1885, with a yearly increase of 0'.4.

The maximum of the eastern variation has probably been reached at this time (1888).

A *second-class whistling buoy* is moored in 21 fathoms of water,  $\frac{3}{4}$  mile NW. by N.  $\frac{1}{2}$  N. from the NW. end of Wa-ad'-dah Island.

This buoy is painted red with the letters N. B. in white; it is sounded by the action of the sea, and when there is a fair swell on it will give 20 to 30 blasts per minute.

It should be left to the eastward in entering the bay.

The following bearings and distances to prominent objects give the position of this buoy:

Koitlah Point.....	SW. by W., 1 $\frac{1}{2}$ miles.
Cape Flattery light-house (Tatoosh Island).....	W SW., 5 $\frac{1}{2}$ miles.

But the light-house cannot be seen from the buoy because a small jutting point, called Chi-bah'-dehl Rock, near Clisseet village, hides it.

The Life-saving Station on the S. shore of the bay lies almost exactly S.  $1\frac{1}{2}$  miles from the buoy.

*Tides.*—The corrected establishment, or mean interval between the time of the moon's transit and the time of high water, is 12<sup>h</sup> 25<sup>m</sup>. The mean rise and fall of tides is 5.8 feet; of spring tides, 7.1 feet; and of neap tides, 4.5 feet. The mean duration of the flood is 6<sup>h</sup> 07<sup>m</sup>, and of the ebb, 6<sup>h</sup> 18<sup>m</sup>.

The *shore-line eastward* from the Wa-ad'-dah Island is quite straight to the small cove on the W. side of Kydaka Point. The trend of the shore is E.  $\frac{3}{4}$  S., and the distance to the cove is 10 miles. Kydaka Point stretches out 1 mile to the northward from the cove. The general trend of the shore from the island to Pillar Point is E.  $\frac{1}{4}$  S. to the distance of 22 miles.

The general characteristics of the nearly straight line of shore E. of Ba-ad'-dah Point are high cliffs, wooded on top, and broken down in places where small short streams have cut through. There are no known dangers outside of the three-fathom line, and the ten-fathom curve is nearly parallel with the shore at a distance of  $\frac{1}{2}$  mile. Depths of 30 fathoms or more are found at 1 mile from shore as far as Kydaka Point, where the deep water is close under the point.

*Sail Rock.*—Two miles E. of Wa-ad'-dah Island and within the limits of the shore kelp, there is a solitary rock 150 feet high. There is a depth of 10 fathoms of water close outside of it. Behind it there is a depression in the cliffs that marks the opening of a small stream called the Ok-ho River

on the Admiralty charts, but this is not the Indian name, and has probably been confounded with the O'-Ko-ho or Hó-ko, 13 miles eastward of Neéah Bay. The Indian name for the stream is To-kwax-ose (Toccosos on the charts). In 1841 the United States Exploring Expedition named the rock Sail Rock from its shape and white appearance. Kellett calls it Klah-o-loh, or Seals (Klah-os-lah on the charts). The Indians sometimes call it Saelock, but this is merely their attempt to pronounce Sail Rock; hence it is occasionally called Seal Rock.

**The Three Hills.**—About midway between Wa-ad'-dah Island and Kydaka Point 3 high wooded hills about 1 mile apart overlook the shore. They are well made out after entering the strait when the NW. end of Wa-ad'-dah Island bears E. by S.  $\frac{3}{4}$  S., distant  $3\frac{1}{2}$  miles; they then appear overlapping each other, and the higher part of Wa-ad'-dah is nearly in line with them. They are shown on the chart but have no name.

**Kydaka Point.**—This is the first point inside of Neéah Bay. It is 11 miles E.  $\frac{3}{4}$  S. from the NW. end of Wa-ad'-dah Island and projects nearly 1 mile north-northwestward from the trend of the shore lying to the westward. There are sunken rocks close under the cliffs, but a depth of 20 fathoms is found within  $\frac{3}{4}$  mile from shore. There is a bight on the western face, but it is broad open to the swell coming up the strait. Behind the point the first mountain close to the shore commences the series of high and broken mountains thence eastward.

**Sekou Point** lies 2 miles W SW.  $\frac{1}{4}$  W. from Slip Point. It is comparatively low and has no dangers under it. Just behind it a noticeable wooded hillock rises to a moderate height, and behind this the heavily wooded hills rise rapidly to a considerable height.

In sailing up or down the strait these different points are seen in a series, just clear of each other, and it requires a local knowledge to determine those which have no special mark.

The position of Clallam Bay is found by its relation to the high, bold, wooded ridge running parallel to the shore-line with an almost vertical water face from Slip Point to the eastward where it ends in Pillar Point. This easily-recognized ridge is about 1,000 feet high, 7 miles long, and falls away rapidly inshore, but with higher mountains 3 or 4 miles back. The water along the face of this rocky wall is very deep and the bottom rocky and irregular; there are rocks along the shore-line, but they are close under it; a depth of 10 fathoms of water is found at  $\frac{1}{4}$  mile from the shore, and anchorage is not good.

In the face of this long line of cliff, and  $2\frac{3}{4}$  miles from Slip Point, there is the opening to a vein of lignite which has been worked but is not suitable for steamboat consumption. It is known as the Fuca Strait Coal Mine. The coal is very easily broken, and crumbles by exposure to the weather.

**Pillar Point.**—This notable point, 500 or 600 feet high, projecting into the strait, is 22 miles E.  $\frac{1}{4}$  S. from the NW. end of Wa-ad'-dah Island, and  $28\frac{1}{2}$  miles W. by S. from Ediz Hook light-house at Port Angeles.

From Race Island light-house it bears SW.  $\frac{3}{4}$  W., distant  $23\frac{1}{2}$  miles. The high, round-topped and wooded hill is slightly separated from the main ridge by a depression; and behind it and on the E. side of Pillar Point runs the small stream called Canel River on the Admiralty chart, but the proper name is the Pysht River, and upon it is the Pysht village; Kellett calls this the Ketsoth village.

Pillar Point is wooded from the water to the summit, which is higher than Slip Point, and from the strait, when Slip Point bears SW.  $\frac{1}{2}$  W., 9 miles distant, Pillar Point shows darkly against the high mountains of the Olympus range. It is then a little higher than the ridge toward Slip Point, which shows as a low saddle with a neck to the eastward.

When a vessel is 3 or 4 miles E SE. from Wa-ad'-dah Island, Pillar Point is the outermost point visible along the south shore of the strait.

When the point is seen bearing SE.  $\frac{1}{2}$  S. 8 or 9 miles distant, it shows a large, black, haystack rock, about 100 feet high, close under the eastern shore of the sloping, wooded point. To the westward of the hill the slight break-down of the ridge is seen with a bright face. Behind it are the outlying high hills of the Olympus range. On the N. face of Pillar Point there is deep water close under the shore; the depth is 50 fathoms at  $\frac{1}{2}$  mile out.

East of Pillar Point the shore is low and trends S SE. for 1 mile, forming a low tongue behind which is the river Pysht. This recession forms an open bay which has less than 3 fathoms of water through it; but from 3 fathoms to 20 fathoms the distance is very short. There is an extensive flat of shoal water under the E. side of Pillar Point occupying nearly all of the area of the bay, and vessels seeking an anchorage here to await the change of tide in light winds, or when uncertain of their position in smoky weather and waiting for the atmosphere to clear up, must keep the lead going constantly and quickly, because the change of depth from 10 fathoms to 2 fathoms is very sudden. There is no kelp here to mark the usual line of 5 or 6 fathoms. There are two large rocks nearly SE. from Pillar Point, and a vessel should anchor well outside the line between the extremity of the point and the easternmost rock.

The river Pysht under Pillar Point is inconsiderable in size, and does not admit the entrance of a boat except at high water.

In the 16 miles east of Pillar Point to Tongue Point, the western part of Striped Peak, the shore recedes in a long curve 2 miles to the southward, and is a line of moderately low clay cliffs

alternating with low shore broken through by many small streams. The shore is bordered close under the cliffs by rocks, and the three-fathom line of soundings average nearly  $\frac{1}{2}$  mile out. There is a narrow field of kelp along the greater part of this shore-line, reaching to 6 and 7 fathoms of water. Outside of this kelp the ten-fathom line averages  $\frac{3}{4}$  mile from shore. On the line between the two points the depth of water is 45 fathoms abreast of Tree Point, off which a depth of 16 fathoms is found 1 mile from the cliff, and 3 fathoms at nearly  $\frac{1}{2}$  mile. There is kelp off this point.

**Low Point and Lyre River.**—This low point is  $11\frac{1}{2}$  miles E.  $\frac{3}{4}$  N. from Pillar Point. There is no kelp off this point and shoal water makes out some distance. The three-fathom line is  $\frac{1}{2}$  mile from the shore and 16 fathoms of water is found at 1 mile. A small stream called the Lyre River breaks through this low point.

From Pillar Point to Crescent Bay an anchorage may be had near the coast in 10 to 6 or 7 fathoms of water in good weather, and the coast chart is sufficient to indicate the general conditions, as there are no known dangers outlying the kelp where it exists. There is very often an uncomfortable swell setting along the shore from the westward.

Behind this sixteen-mile stretch of shore the wooded hills rise to the first broken range, and farther in higher wooded hills outlie the Olympus range of mountains. Kellett places one mountain of 4,000 feet elevation 6 miles from Low Point in a S SE. direction.

**Striped Peak.**—From Pillar Point the next prominent object is the high wooded hill called Striped Peak, which is 1,265 feet above the sea. The summit, a short distance back from the shore, bears E NE.  $\frac{1}{4}$  E.  $17\frac{1}{4}$  miles from Pillar Point.

The outline of this peak is more regular than any other along the S. shore of the strait, appearing like a low, flat cone. When Striped Peak bears E. by S. at a distance of 5 miles it shows up very dark in color and regular in form. To the northward and eastward is seen the low Angeles Point, and over it higher and more distant land. To the southward are seen the high, snow-covered peaks of the Olympus Mountains and a double-peaked intermediate mountain over the bright cliff of Crescent Bay. When seen to the E.  $\frac{1}{4}$  N. at a distance of 27 miles it is the outermost point of land and its seaward slope is a straight line, but from the peak southward the slope is not so perfect. A vessel coming out of Victoria sees Striped Peak just to the eastward of Race Island light-house bearing S. by W. from 19 to 15 miles, and its outline is nearly as regular as from other directions.

This mountain is in the middle of a straight line of rocky, bluff shore, 3 miles long E. by N. and W. by S., between Tongue Point at the W. and Observatory Point at the E.

There is a line of kelp close under this shore, and the twenty-fathom line of soundings is not more than  $\frac{1}{2}$  mile from the shore.

Behind Striped Peak the mountains rise rapidly toward the Olympus range. Kellett has located several of these. The nearest one has an elevation of 3,500 feet and lies S SE. 7 miles distant; another peak, 6,012 feet high, is S. by E., distant  $11\frac{1}{4}$  miles; a third mountain, of 6,275 feet, bears S SE.  $\frac{1}{4}$  E., distant  $13\frac{1}{2}$  miles.

Striped Peak was so named from a well-marked line of exposed earth on the water side extending from close under the summit very nearly to the water. The mark is almost obliterated by the growth of vegetation.

#### CRESCENT BAY.

Tongue Point lies  $1\frac{1}{2}$  miles W. by S. from Striped Peak, and it forms the eastern side of a slight indentation of the shore-line, extending 1 mile to the westward, where another low point extends out  $\frac{1}{2}$  mile to form Crescent Bay. Tongue Point has several visible rocks stretching out  $\frac{1}{4}$  or  $\frac{1}{2}$  mile to the westward. The western point, called Altawas by the Indians, has a *sunken rock*  $\frac{1}{2}$  mile northward with 15 feet of water over it and upon which the swell breaks at low water. There is a depth of 8 fathoms close outside and 6 fathoms on the E. and W. This is the only known hidden danger on the S. shore of the strait inside of Duntze Rock. A *red buoy* has been placed outside this sunken rock in 4 fathoms of water. Inside the points of the bay there is a depth of 6 fathoms, and 20 fathoms less than  $\frac{1}{2}$  mile outside.

There is no good anchorage here, as the bottom is not good and the currents between the rock and the reef off Tongue Point are treacherous.

#### FRESH WATER BAY.

About  $1\frac{3}{4}$  miles E. of Striped Peak is the moderately low wooded extremity of the land stretching from the peak and forming the western point of Fresh Water Bay. This is known as Observatory Point, and has several visible and sunken rocks running nearly  $\frac{1}{2}$  mile to the eastward.

The eastern point of the bay is the low delta named Angeles Point, under the western side of which empties the Elwha River by several mouths.

Angeles Point bears NE. by E.  $\frac{3}{4}$  E., 3 miles from Observatory Point, and from the line joining these the southern shore recedes a little over 1 mile with an irregular outline. On the line of the two points the depth of water is about 15 fathoms; inside of it the depth decreases to 6 fathoms at about  $\frac{1}{2}$  mile from the shore, which is clean except toward the western part, where there is a narrow line of

kelp for  $1\frac{1}{2}$  miles to Observatory Point. Off the delta the depth decreases from 1 to 10 fathoms in 1 mile; and to the eastward of Angeles Point a great bank having from 5 to 10 fathoms of water upon it stretches northward 1 mile and eastward toward Ediz Hook.

The spit off Point Angeles must be approached with great care in thick weather, because there are no trees on the extreme point, and therefore it cannot be seen until one is close upon it, although if the lead is used frequently it will give fair warning of its proximity.

Fresh Water Bay is an open roadstead, but anchorage may be had in moderate weather. But it affords no shelter from the westerly swell except close under the lee of the rocks off Observatory Point, where a vessel may find comparatively smooth anchorage with good holding ground close up to the kelp. In the eastern part of the bay the bottom is rock, on which the anchor will not hold.

#### THE ELWHA BANK.

Northeastward of the low delta of Angeles Point an extensive ten-fathom bank reaches more than half way to Ediz Hook. The western limit of the ten-fathom curve stretches **N NE.** about  $1\frac{1}{2}$  miles and then runs nearly **E NE.** for 3 miles, when it drops off suddenly into 50 fathoms. Outside these limits to the **W.** and **NW.** the twenty-fathom line reaches  $\frac{3}{4}$  mile. Inside of the ten-fathom line the depth is moderately regular in to the three-fathom line, which is  $\frac{1}{2}$  mile from the shore. But under the eastern point, and thence inshore to the western part of the Ediz Hook, the deep pocket of 40 fathoms cuts under to the westward. There is frequently a very heavy swell on this bank, and there is no protection from it. The bottom is gravel and broken shells and fine gray sand inshore. In the pocket the bottom is fine sand and mud.

#### PORT ANGELES.

Eleven miles **E NE.**  $\frac{1}{2}$  **E.** from Striped Peak and  $6\frac{1}{2}$  miles **E NE.**  $\frac{1}{2}$  **E.** from Angeles Point is the light-house upon the eastern extremity of the Ediz Hook.

This hook is a long, low, very narrow sand spit stretching out from the clay bluff 3 miles **NE.** by **E.**, with a regular sweeping curve swelling a little to the **NW.** The extremity lies  $1\frac{1}{2}$  miles off the main shore, and thus an excellent and extensive harbor is formed, protected from the **N.** round by the **W.** and **S.**, but open to the eastward, with deep water of 25 to 30 fathoms over a sandy bottom close under the inside of the sand spit almost to the head of the bay. Through the center of the bay we found a line of 15 fathoms over sticky bottom, and between that and the main shore it shoals very regularly, with the same kind of bottom. The three-fathom line lies as much as  $\frac{1}{4}$  mile from the south shore, and there is a broad, low-water beach; but in places the clay bluff, which is about 75 feet high, comes almost directly to the high-water line. The bluff and the flat country back of it are densely wooded.

Fresh water is found at several places on the south shore, but the extensive flats render it difficult to obtain.

Under the south shore is the site of the town of Port Angeles, stretching for  $1\frac{1}{2}$  miles **E.** and **W.**, but at present principally represented by a small settlement abreast Taylor's (or Norman's) Creek, from which extends a wharf 700 feet into the bay, with a **T** 100 feet long. There is a depth of  $16\frac{1}{2}$  feet of water at the end of the wharf, which lies  $1\frac{3}{4}$  miles **SSW.**  $\frac{1}{2}$  **W.** from the Ediz Hook light-house. On the outside of the spit very deep water is found close to it, and the hook may be rounded within a cable's length in 25 fathoms. Half-way from the light-house to Angeles Point is the eastern edge of the Elwha Bank, with 10 fathoms of water; it has been already described.

In foggy and smoky weather, with no wind and the currents unknown, a vessel on this side of the strait must be vigilant and keep the lead going.

Vessels coming up the strait and bound for Departure Bay sometimes go into Port Angeles and telegraph to Port Townsend for a tug.

The hook is covered with coarse grass, and in many places with driftwood, showing that the sea sometimes washes over it. Although it lies well out of the line of vessels bound either in or out of the strait, it has been deemed necessary to mark it with a light-house. In thick, hazy weather it would probably be distinguished if clumps of trees were planted upon it, as we recommended in 1852 for the low tongue of New Dungeness. From the middle of the strait the hook cannot be seen, and its position is ascertained by the light-house buildings or the peculiarities of the bluff beyond.

At the head of the bay, and connected therewith by a small outlet, there is a large salt-water lagoon. The beach at the head of the bay affords a capital beach for heaving down a vessel.

#### THE LIGHT-HOUSE ON EDIZ HOOK, PORT ANGELES.

The light-house is within 55 yards of the eastern extremity of the hook forming the northern side of the bay of Port Angeles, and 67 yards from the inner beach. The structure consists of the keeper's dwelling of one and a half stories, painted white, from which rises, just above the roof at the outer end, the short square tower, also painted white, with the dome of the lantern black. The height of the focal plane is 35 feet above the base and 42 feet above the sea. The light is a *fixed*

## NEW DUNGENESS BAY.

*white light* of the fifth order, illuminating the entire horizon. In ordinary states of the atmosphere it should be seen from a height of 15 feet, 12 miles.

Its geographical position, as determined by the U. S. Coast and Geodetic Survey, is:

Latitude.....	48° 08' 24'' N.
Longitude.....	123° 24' 07'' W.

The light-house is visible in daytime from a ship's deck when abreast of Race Rock light-house.

The magnetic variation for January, 1885, was 20° 40' east, and it was then at the period of maximum variation.

**Fog-signal.**—The bell-tower structure is the frustum of a square pyramid 30 feet high and 15 feet square at the base, and painted white. It is situated 108 yards **NW.** by **N.** from the light-house. The *bell* is struck by machinery, and during thick and foggy weather is sounded a *single blow* at intervals of 15 seconds.

From this light we have the following bearings and distances to important points:

Race Island light-house.....	NW. $\frac{1}{2}$ W., 10 $\frac{1}{2}$ miles.
Esquimalt light-house.....	NNW. $\frac{1}{2}$ W., 17 $\frac{1}{2}$ miles.
Victoria light-house.....	NNW. $\frac{1}{2}$ W., 17 miles.
Port Discovery light-house.....	N. $\frac{1}{2}$ W., 18 $\frac{1}{2}$ miles.
Smith's Island light-house.....	NE. $\frac{1}{2}$ N., 24 $\frac{1}{2}$ miles.
New Dungeness light-house.....	NE. $\frac{1}{2}$ E., 12 miles.

**Tides.**—These were observed in 1884 during the progress of the hydrography, and while they follow the general law for the Pacific Coast they proved to be very irregular and perplexing. It often happened that there was no perceptible movement of the tide for five or six hours and but a few inches throughout the day. The mean rise and fall of the tides is 4.7 feet.

The corrected establishment or mean interval between the time of the moon's transit and the time of high water is 14<sup>h</sup> 16<sup>m</sup>, but they may occur 2<sup>h</sup> 30<sup>m</sup> earlier or later.

## NEW DUNGENESS BAY.

The shore from the head of Port Angeles runs in a slightly curving line for 9 miles to the **E NE.** and at 7 miles from Ediz Hook it runs nearly straight for 6 miles, to the New Dungeness light-house.

The slightly projecting point in the deepest part of this bight and 4 $\frac{1}{2}$  miles **E.** by **S.** from Ediz Hook light-house is Green Point. It has 5 fathoms of water at  $\frac{1}{4}$  mile outside. To the eastward of it there is no kelp; to the westward for 4 miles there is a field of kelp reaching out to 7 fathoms of water.

Four and one-fourth miles **NE.** from Green Point another long, low, narrow sand spit, covered with coarse grass and very similar to Ediz Hook, leaves the high clay bluff shore and stretches in a general **N NE.** direction for 3 $\frac{1}{2}$  miles. This spit forms the northwestern shore of the roadstead of New Dungeness.

The **SE.** shore is distant 2 miles **S.** by **E.** from the light-house, and runs 6 miles to the **E SE.** to Washington Harbor. This leaves the bay broad open to the **E NE.**

The depth of water along the outside of the spit is very great; at  $\frac{1}{2}$  mile this depth is 10 fathoms over hard sand and gravel bottom, and it drops off very suddenly to 30 fathoms within  $\frac{1}{2}$  mile. Along the outer southern part of the spit toward the bluff the ten-fathom curve stretches out 1 $\frac{1}{2}$  miles, and the twenty-fathom curve runs on nearly a straight line to within 2 miles of Ediz Hook.

Off the northeastern extremity of the spit a long gravel reef extends over  $\frac{3}{4}$  mile from the light to the **N NE.**, dropping off suddenly from 5 and 10 fathoms to 50 fathoms of water with heavy rips at the change of the tides and currents, as the three-fathom curve extends out  $\frac{3}{4}$  mile from the light. This danger is marked by a buoy, as hereafter described.

The depth of the bay to the westward is much inferior to that at Port Angeles, because on the inside of the main spit at 1 $\frac{1}{2}$  miles from the extremity a second spit makes directly **S.** for 1 $\frac{1}{2}$  miles and reaches to within  $\frac{1}{4}$  mile of the southern bluff. This second spit divides the bay into the outer or eastern harbor proper and the inner shoal-water bay or estero, which is 2 $\frac{1}{2}$  miles long **N NE.** and **S SW.** by  $\frac{1}{4}$  mile wide. It is occupied by marsh and extensive flats. Through the narrow channel connecting the two the water passes as over a rapid at low tide.

Abreast of this point is a narrow passage, which is the opening of the Dungeness River, under a bluff 60 feet high, upon which was a large village of the Clallams. An abundance of fresh water is to be had at this stream, but boats must obtain their supply at low tide and come out when the tide has risen sufficiently. The eastern shore of the Dungeness River is low, swampy, and covered with trees and brush. It forms the main or southern shore of the roadstead, and off it lie the extensive mud flats, which are bare at low water for  $\frac{1}{2}$  mile to the northward, and continue as far to the **E SE.** as Washington Harbor. The area of the outer harbor is restricted by the flats  $\frac{1}{2}$  mile in width, lying under the **E.** side of the secondary spit, and by the extensive mud flats on the southern shore, where the three-fathom line is  $\frac{1}{2}$  mile from the low shore.



Beyond these flats the depth of the water throughout the harbor ranges to 10 fathoms with soft, tenacious, muddy bottom. The deepest water is under the extremity of the spit, where a depth of 20 fathoms is found  $\frac{1}{2}$  mile from the light-house; but the best anchorage is close under the spit in 10 fathoms of water  $\frac{1}{4}$  mile from the beach to the NW., with the light-house bearing N. by E.  $\frac{1}{2}$  E., distant  $\frac{1}{2}$  mile. A steamer may anchor closer in to the NW. of this location, with the light-house bearing NW. by N., distant  $\frac{3}{4}$  mile; anchorage is had in 10 fathoms over soft, sticky bottom; the nearest shore to the southward is  $1\frac{1}{4}$  miles, and the nearest mud flat in that direction is distant  $\frac{3}{4}$  mile.

A SE. wind drawing out of the strait blows directly into this harbor, but the bottom will hold any vessel with good ground tackle. The only difficulty is to get the anchors out of the mud after riding out a gale for 2 or 3 days. In the last position mentioned for anchorage a vessel can readily get under way when the SE. wind comes up, and clear the point and the danger off it.

This point is so low that vessels bound in or out of the harbor, before the erection of the light-house, were upon it before they were aware of their danger. Several had run ashore on the outside beach; and in 1855, while we were anchored close under the point, with the weather thick and hazy, a vessel from Admiralty Inlet had been set out of her course by the currents, and came driving in with studding sails set, and only saw her mistake and danger when the black hull of our vessel attracted her attention.

In December, 1871, the spit was cut through by the sea during a heavy NW. gale, which made a breach 50 yards in width.

#### THE LIGHT-HOUSE AT NEW DUNGENESS.

The structure is about  $\frac{1}{4}$  mile from the eastern end of the point, and consists of a keeper's dwelling of stone of a grayish yellow color, with a tower of brick 89 feet high and rising about 65 feet therefrom. It is the frustum of a cone, of which the upper half is painted black and the lower half white. But when seen from the northward at some miles the dark-gray dwelling makes the tower appear to have a lower dark band. The tower is surmounted by an iron lantern, painted red; the height of the focal plane is 100 feet above the level of the sea.

The light shows a *fixed white light* of the third order, illuminating the entire horizon. It should be seen from a height of 15 feet, 16 miles.

Its geographical position, as determined by the Coast and Geodetic Survey, is:

Latitude.....	46° 10' 55'' N.
Longitude.....	122° 06' 31'' W.

The magnetic variation for January, 1885, was 22° 40' east; there was no yearly variation, as the maximum variation had been reached.

From the light-house we have the following bearings and distances to important points:

Ediz Hook light-house.....	SW. $\frac{1}{2}$ W., 12 miles.
Race Island light-house.....	W. $\frac{1}{2}$ S., 18 $\frac{1}{2}$ miles.
Esquimalt light-house.....	WNW., 20 miles.
Victoria light-house.....	NW. by W. $\frac{1}{2}$ W., 18 $\frac{1}{2}$ miles.
Discovery Island light-house.....	NW. $\frac{1}{2}$ N., 15 $\frac{1}{2}$ miles.
Smith's Island light-house.....	NNE. $\frac{1}{2}$ E., 13 $\frac{1}{2}$ miles.
Admiralty Head light-house.....	ENE. $\frac{1}{2}$ E., 17 $\frac{1}{2}$ miles.
Point Wilson light-house.....	ENE. $\frac{1}{2}$ E., 14 $\frac{1}{2}$ miles.

During the surveys of this part of the strait the light-house at New Dungeness frequently exhibited the extraordinary effects of unusual refraction during the periods of calm and warm weather which prevail in the summer and part of the fall. At times the light-house tower would be raised up five times its usual height and then suddenly change to a low black line close to the ground.

**Steam Fog Signal.**—About 150 yards to the northeastward of the light-house, and very near the extreme northeastern point, is the small building containing the steam fog-whistle. The sounding apparatus is a twelve-inch *steam whistle*, which is *sounded every minute during* thick, foggy, and smoky weather, with the following characteristics: *blast 6 seconds, interval 12 seconds; blast 3 seconds, interval 39 seconds.*

The surveying brig *Fauntleroy* reports that when at anchor in Port Townsend the fog-whistle of New Dungeness has frequently been heard.

**Buoy off the Point of New Dungeness.**—A *first-class nun buoy, painted red and numbered 2*, has been placed in 27 feet of water, in hard, sandy bottom, to mark the end of the long gravel reef which extends fully  $\frac{1}{4}$  mile from the light-house toward the NNE.

The reef outside of it drops off rapidly, but to the WNW. and ESE. it drops off very suddenly to 20 and 13 fathoms of water. Half way between this buoy and the light-house the reef has a spot with only 16 feet of water upon it.

The buoy must be left to starboard by vessels entering the New Dungeness roadstead or bound up the strait.

From this buoy the—

Light-house on the point bears.....	S. by W. $\frac{1}{2}$ W., $\frac{1}{2}$ mile.
Point Wilson light-house.....	NNE. $\frac{1}{2}$ E., 14 miles.
Ediz Hook light-house.....	NW. $\frac{1}{2}$ W., 12 $\frac{1}{2}$ miles.



## WASHINGTON HARBOR.

*Tides.*—The approximate corrected establishment, or mean interval between the moon's transit and the time of high water, is 15<sup>h</sup> 07<sup>m</sup> and the mean rise and fall of the tide 4 $\frac{2}{10}$  feet.

Eastward of New Dungeness to the entrance of Admiralty Inlet, 14 miles, there is a deep recession of the general shore-line for 5 miles to the southeastward, with openings into Washington Harbor and Port Discovery. In this recession there is a large island off the mouth of Port Discovery. On the line between Point of New Dungeness and Point Wilson there is the northern limit of the Dallas Bank, which stretches **N NE.** from Protection Island.

## WASHINGTON HARBOR.

From New Dungeness roadstead to the entrance of this harbor the immediate shore-line is nearly straight for 5 $\frac{1}{2}$  miles on a general course **SE.** by **E.**  $\frac{1}{2}$  **E.**, with a slightly-projecting angle midway, called Kulo Kala Point. The shore is low and flat, covered with trees, and bordered by an extensive mud flat averaging nearly 1 mile wide; but behind it at a very short distance there arises an apparently level plateau heavily wooded and densely filled with underbrush. The entrance to the harbor is nearly closed by a low sand spit stretching across from the eastern almost to the western side, where a narrow channel-way of perhaps 200 yards breadth exists, having a depth of 2 fathoms through it. This spit is covered sparsely by stretches of coarse grass and cannot be seen from New Dungeness Point on account of the outward curving of the intermediate shore, but the bluff is seen at the **NE.** part of the harbor, whence the sand spit starts. Abreast the **W.** end of the sand spit the opposite shore is formed by the point of a bluff, to the northwestward of which is a low, sandy point, from which stretches out a shoal which marks the channel in approaching the entrance. The points of the bluff at the mouth of the harbor are a mile apart; the general direction of the spit between them is **SW.** and **NE.** The bluff at the **NE.** is named Pitship on the latest chart. That at the **SW.** is named S'quim.

Inside the harbor the general depth of the water is 10 to 20 fathoms, over a muddy bottom, and 6 fathoms of water can be carried nearly to the head. The breadth of the harbor is a little over 1 mile, and its general direction **SE.** for 3 $\frac{1}{2}$  miles. The shores of the harbor rise rapidly, and are heavily covered with the Oregon pine. At the head of the harbor the wooded mountains rise to 2,100 and 2,600 feet within 2 or 3 miles.

To enter this harbor a vessel must approach Pitship bluff and then keep close under the **NW.** side of the entrance spit and round it closely, because a shoal makes from the western low spit across the narrow entrance and overlaps it. In the approaches outside of this small shoal a depth of 10 fathoms of water is found about  $\frac{3}{4}$  mile from either shore, increasing to 20 fathoms over a stiff, muddy bottom at 1 mile. Inside the entrance a long shoal makes out to the **SE.** from the end of the spit, thus confining the channel under the western shore.

## PROTECTION ISLAND.

This island is 1 $\frac{3}{8}$  miles long and about  $\frac{2}{3}$  mile wide across the middle. Its general direction is **NE.** and **SW.**, and it lies 1 $\frac{3}{8}$  miles squarely off the entrance to Port Discovery. There is a long, low point at each end of the island; that at the **W.** is rocky and sand, that at the **E.** all sand. The highest part is near the western extremity, and reaches an elevation of 215 feet, but the fir trees which cover this end of the island make it look much higher. The sides are very steep, and rise from 90 to 130 feet high. The seaward crest of the eastern part is covered with a narrow fringe of stunted pines; the eastern slope is steep and grassy, and that toward Port Discovery is undulating and covered with fern. The principal part of the eastern half of the island is cultivated.

Midway up the face of the cliff toward the **NW.** and near the angle of the northern shore there is a horizontal streak of gray glacial clay almost 3 feet broad, which is a local feature easily recognized.

The **SW.** extremity of the island lies 7 $\frac{1}{2}$  miles **W.**  $\frac{1}{2}$  **S.** from the New Dungeness light-house, and the northernmost part of the island is 7 miles **SW.** by **W.**  $\frac{1}{4}$  **W.** from Point Wilson light-house.

The **SW.** point of the island is 2 miles **WNW.**  $\frac{3}{4}$  **W.** from Clallam Point at the **W.** side of the entrance to Port Discovery, and the **NE.** point is 1 $\frac{3}{8}$  miles **NW.** by **W.**  $\frac{3}{8}$  **W.** from Point George at the **E.** side of the entrance.

On the inside of Protection Island there is a good broad passage round either end. In the eastern passage the width of the channel between the five-fathom lines is 1 $\frac{1}{2}$  miles, with good water close under Cape George and very deep water off the point of Protection Island. There is a depth of 53 fathoms in the channel. The width of the western passage between the black buoy off the **W.** point of Protection Island and the nearest bluff to the **SW.** 1 $\frac{1}{2}$  miles **W.** of Clallam Point, is 1 $\frac{1}{2}$  miles. The greatest depth of the channel is 65 fathoms.

Vessels bound into Port Discovery from the strait with a southerly wind enter by the western passage, because the southerly wind draws out of Washington Sound and gives a fair working breeze to reach Point Clallam.

On the inside shore of the island there is moderately deep water close under the banks, and anchorage may be had in 10 fathoms about 300 yards off the shore. There is no kelp off this shore

except in the middle of summer, when there is a little near the buoy. **N NW.** of the island an extensive shoal makes out to the **N NW.**, known as the Dallas Bank. Directly off the shore the three-fathom line extends fully  $\frac{1}{2}$  mile out, and the outer line of the kelp marks the four-fathom line. The limit of the ten-fathom line of this bank is  $2\frac{1}{2}$  miles to the **N NW.**, or  $\frac{1}{2}$  mile outside the line between New Dungeness light-house and Point Wilson light-house; the breadth is about  $1\frac{1}{2}$  miles. This ten-fathom line runs sharply to the **E.** point, but it swings  $\frac{3}{4}$  of a mile off the **W.** point and  $\frac{1}{2}$  mile out to the **SW.** by **W.**, and beyond the black buoy. This bank affords anchorage when a vessel is baffled with light airs and strong adverse currents. The bottom is irregular, full of huge bowlders toward the island, and sand and gravel toward the strait. The bottom falls off suddenly on the **E.** side of the bank to 30 and 40 fathoms, and on the **W.** side to 20 and 30 fathoms.

The latest chart does not give a shoal spot of 3 and 4 fathoms near the outer limit of the bank, laid down by Kellett. It is almost exactly on the line between New Dungeness light-house and Point Wilson light-house, and  $6\frac{2}{3}$  miles from the former and  $7\frac{2}{3}$  miles from the latter. This places it on the **NW.** edge of the bank, so that there may be some slight error in the position. The surveying brig *Fauntleroy* frequently passed over this locality in search of this shoal spot.

**Buoy off Protection Island.**—A first-class can buoy painted black and numbered 1 has been placed in  $5\frac{1}{2}$  fathoms of water about  $\frac{1}{2}$  mile from the end of the sand and rocky spit which makes out  $\frac{1}{3}$  mile from the **SW.** point of Protection Island. When vessels are entering Port Discovery by the western passage under the **S.** side of Protection Island, they leave the buoy on the port hand. There is very deep water close under it toward the southern shore, but a five-fathom tail of the Dallas Bank reaches  $\frac{1}{2}$  mile **W SW.** from the buoy.

At the buoy the following bearings and distances are given to important objects:

New Dungeness light-house bears .....	<b>W. <math>\frac{1}{2}</math> N., <math>7\frac{1}{2}</math> miles.</b>
Southwest end of Protection Island.....	<b>E. by N. <math>\frac{3}{4}</math> N., <math>\frac{1}{2}</math> mile.</b>
Clallam Point .....	<b>E. by S. <math>\frac{3}{4}</math> S., 2 miles.</b>

## PORT DISCOVERY.

This land-locked bay lies in the eastern part of the bight between New Dungeness and Point Wilson. The western point is just 5 miles nearly **NE.** from the entrance to Washington Harbor. It is not readily made out by a vessel in the strait, because the entrance appears blockaded by Protection Island and the wooded shores of the bay overlap.

From New Dungeness light-house the western head of the entrance to the port named Clallam Point is  $9\frac{1}{2}$  miles distant, and bears **E.  $\frac{3}{4}$  S.** From the New Dungeness buoy it is 9 miles **E NE.  $\frac{1}{4}$  E.** and that line passes just **S.** of the black buoy off the **SW.** point of Protection Island.

The intermediate  $4\frac{1}{2}$  miles of shore between Washington Harbor and Port Discovery is slightly curved toward the **NW.**, and is formed of high, broken cliffs. The highest cliff is about  $1\frac{1}{4}$  miles **SW.** from Clallam Point, and is probably 200 feet above the sea. The surface above the cliffs is densely covered with the Oregon pine and a thick undergrowth. The five-fathom line is quite close under the cliffs, and the ten-fathom line does not average  $\frac{1}{4}$  mile from them. There is no kelp along this shore.

The western or Clallam Point is low, but rises quickly to a moderate height and slopes to the southward. The eastern point of the entrance to Port Discovery is Cape George, and it is  $1\frac{1}{2}$  miles **NE.  $\frac{1}{4}$  N.** from Clallam Point. It is a steep cliff that rises directly from the water, which is very deep under the **S.** side; under the **N.** side the three-fathom curve is not over 200 yards from the shore. The average width of the bay is nearly  $1\frac{3}{4}$  miles for 9 miles of its length, and then decreases rapidly to the Salmon River. It makes four general courses from the entrance to the head, as follows:  $1\frac{1}{4}$  miles **S.**, 4 miles **E SE.  $\frac{1}{4}$  E.**,  $2\frac{1}{2}$  miles **S. by E.**, and  $1\frac{3}{4}$  miles **SW. by S.** The shores are abrupt, and covered with wood to their edges, and the projecting parts are all terminated by low points stretching out short distances with deep water off them. On the second point, on the eastern side, were (1856) the remains of an extensive stockaded village of the Clallams. When a vessel enters the bay Mount Chatham rises up toward the **S.** and overlooks all these waters; it is only  $2\frac{3}{4}$  miles from the nearest shore and reaches 2,110 feet in elevation. It lies **W SW.** from Point Discovery.

When well in this bay Protection Island so completely shuts up the entrance as to make it appear as a large lake. The great drawback to this port is the depth of water, which in mid-channel is not less than 25 fathoms in any place, and in some places it is 40 fathoms. Under the second low point on the **E.** we could not find less than 25 fathoms of water a few ship lengths from the beach, but found good anchorage in 20 fathoms, soft bottom, on the western shore 2 miles **S SE.** from Clallam Point, and abreast of a low swampy beach.

In the deepest part of the bight between Clallam Point and this anchorage, off the mouth of Eagle Creek, there is good anchorage in 10 fathoms of water about 400 yards off the shore.

At the head of the bay it contracts in width, the water shoals, a large mud flat exists for the last mile, and the shores become higher; but in places the hills retreat, and give a scanty space for a few settlers' cabins. For a few years after the settling of San Francisco many vessels came here for piles and spars; but a large saw-mill has been built upon Point Discovery, which is the third point inside on the western shore where the bay is scant 1 mile wide and the depth of water in mid-channel is

## PORT DISCOVERY.

22 fathoms. This is a low point projecting slightly from the main line of bluff. There is good anchorage in the bay near the saw-mill.

The Port Discovery mills reported from 1884 their output as 25,000,000 feet of lumber, 12,000 piles, and 8,000,000 laths, of a total value of \$346,000.

They have a capacity of 100,000 to 120,000 feet of lumber a day.

When a vessel is in the strait with Port Discovery partly open just to the E. of Protection Island, the steam from the saw-mill is seen rising as a high, white column in marked contrast with the dark fir foliage on either hand. Directly W SW. from the saw-mill is the high wooded mass of Mount Chatham, already mentioned.

*Tides.*—The corrected establishment, or mean interval between the time of the moon's transit and the high water is 15<sup>h</sup> 44<sup>m</sup>. To find the times and heights of each and every tide throughout the year consult the Tide Table for the Pacific Coast, published annually.

The peninsula between this port and Washington Harbor averages about 3 miles in breadth; it is high, rolling land covered with trees.

Between this port and Port Townsend the average width of the peninsula is also 3 miles, with a rolling country covered with trees, but with prairie and cultivation toward Port Townsend.

**Middle or Rocky Point.**—Eastward of Cape George the general direction of the shore-line is NE. by N., and the distance is 5½ miles, but midway between these points there is an obtuse angle in the shore-line from which a sharp point projects out nearly ½ mile. The whole shore-line lies at the base of high, yellow, clay cliffs which reach 400 or 500 feet elevation toward the low reach of Point Wilson.

Rocky Point has a depth of 5 fathoms of water within ½ mile of the shore and 10 fathoms at ¾ mile. There is very deep water, 40 to 50 fathoms, between it and Protection Island; there is also very deep water of 74 fathoms 2 miles to the NW., and 15 fathoms at a mile off shore thence to Point Wilson. There is no kelp out to 6 and 7 fathoms for 1½ miles along shore to the NE.

The currents off this point are conflicting from its proximity to the entrance to Admiralty Inlet, the Dallas Bank, and the passage to Port Discovery.

**Buoy off Middle or Rocky Point.**—To mark a *small sunken rock* off Middle or Rocky Point, a *third-class nun buoy painted with red and black horizontal stripes* has been placed in 15 feet of water ½ mile NE. by N. from the extremity of the point and outside and close to this danger, which is *awash* at the lowest tides. Vessels should give this buoy a berth of 100 yards.

From this buoy we have the following bearings and distances to important objects:

New Dungeness light-house.....	W. by S., 11 miles.
Point Partridge .....	North, 6 miles.
Point Wilson light-house .....	NE. by E. ½ E., 3½ miles.

In foggy, thick, or smoky weather the lead must be kept going when approaching this point.

**Point Wilson.**—This point lies in the southeasternmost part of the Strait of Fuca, at the entrance to Admiralty Inlet, of which it forms the western point. It is also the northwestern point at the entrance of Port Townsend.

The point bears E NE. ½ E. 14½ miles from New Dungeness light-house, and this line passes over the northern part of the Dallas Bank nearly midway between the two points.

The high yellow clay cliffs surmounted by heavy forests run from Port Discovery toward Port Townsend and reach a height of 400 or 500 feet near Rocky Point; they are very steep and break down suddenly under a hill 250 feet high, ¾ mile before reaching the extremity of Point Wilson. This point stretches out toward Admiralty Head and is formed of low, sandy hillocks covered with coarse grass. The S. shore of the point sweeps to the S. and again meets the high land in ½ mile. Gravel and shingle show at the water line.

On the extremity of the point are the light-house buildings.

Between Rocky Point and Point Wilson the general direction of the line of cliffs is NE. by E. and off the shore the five-fathom line is less than ¼ mile distant, except within ¾ mile of Point Wilson, where it reaches out ½ mile over a very rough, rocky, and shingly bottom with a field of kelp to mask it. The kelp field is well off the point on the N. side of the slight bight just W. of the low extremity. The ten-fathom line lies about ¾ mile from the shore. Directly off the point toward Admiralty Harbor a depth of 20 fathoms is found 100 yards from the beach, and the currents make by it with great velocity. During the ebb tides a very strong eddy current sets to the eastward along shore from Middle or Rocky Point, and even as far as Port Discovery. In 1855 when we were coming out of the inlet on the large ebb with scarcely any wind we kept outside of the rip showing the line of the eddy. A vessel 2 or 3 miles ahead was in the eddy at the same time. We were carried past Protection Island, but she was drifted back to Point Wilson. The Indians, when bound to New Dungeness, keep well out in the ebb. Vessels working out from Port Townsend with the strong summer winds hold well under the SE. shore of Point Wilson, carrying 3 fathoms within 250 yards of the beach SW. of the light-house, and round the point close aboard.

In approaching the point from the strait in foggy or thick, smoky weather the fog-whistle on the point will give sufficient warning; but if it should not be heard the lead must be kept going.

## LIGHT-HOUSE ON POINT WILSON.

The light-house is very near the extremity of the point, where it is not more than 10 feet above the level of the sea. The structure consists of a keeper's dwelling of one and a half stories high, painted white. From this house rises for a short distance above the roof the square tower, painted white and surmounted by a lantern and dome painted black. The fog-signal building is painted white and adjoins the dwelling toward the water front.

As seen from the water the buildings show as a cluster of white houses with dark roofs on the low point, at the extremity of which is a flagstaff. There are low, straggling trees inside them and reaching to the high cliff covered with large firs and pines.

The light is *fixed white* of the fourth order, illuminating 270 degrees of the horizon.

The height of the focal plane is 46 feet above the base and 53 feet above the mean level of the sea, and under ordinary conditions of the atmosphere it should be seen from a height of 15 feet, 12 miles.

The geographical position, as determined by the U. S. Coast and Geodetic Survey, is—

Latitude.....	48° 08' 39'' N.
Longitude.....	122° 45' 14'' W.

In January, 1885, the magnetic variation was 22° 28' east, and was decreasing annually 4'.

The bearings and distances to important points are given as follows :

Race Island light-house .....	W. by S., 32½ miles.
Esquimalt light-house .....	W. ½ N., 32½ miles.
Discovery Island light-house .....	W NW. ½ W., 25 miles.
Black Buoy on Partridge Bank.....	NW. ½ W., 7½ miles.
Smith's Island light-house .....	NW., 11 miles.
Red Buoy off Point Partridge .....	NW. ½ N., 5½ miles.
Admiralty Head light-house .....	NE. ½ E., 3½ miles.

It is reported that for some years a shoal spit has been making off this point, and now a berth of ½ mile is safe in rounding it.

**Fog Signal.**—Between the light-house building and the extreme point there is a small white building for the fog-signal apparatus. This is a twelve-inch *steam whistle* sounded every minute in thick and foggy weather. The *length of the blast is 3 seconds* and the *length of the interval between the blasts is 52 seconds*.

Vessels entering Admiralty Inlet from the Strait of Fuca stand for Admiralty Head light on a course E. by N. ¼ N., having Point Wilson light-house open on the starboard bow; and when Point Wilson light-house bears SW. by S. ¼ S., distant 1½ miles, Point No Point light will be open through the middle of the inlet bearing SE. ½ E., distant 16½ miles. In that position a vessel is rather nearer Admiralty Head than Point Wilson, and the course to Point No Point clears Marrowstone Point nearly ½ mile, Bush Point ½ mile, and Double Bluff nearly a mile, so that the course must be changed as hereafter described.

**Quimper Peninsula.**—Between Port Discovery and Port Townsend lies a peninsula averaging 3 miles in breadth and 10 miles long. It is reasonably undulating land and has many large farms. It offers great advantages as a location for a commercial town, and in time it will be connected directly by rail with the Columbia River by way of the Cowlitz Valley.

**Point Partridge.**—This is the western point of Whidbey Island, the eastern boundary of the Strait of Juan de Fuca. It may be considered the northern part of the entrance to Admiralty Inlet and Puget Sound, with Point Wilson as the northwestern point, although Admiralty Head and Point Wilson are, strictly considered, the two points at the entrance.

The seaward slope is very steep and shows large areas of sand and sandy soil. The coast-line is level on the summit, which is covered with spruce, fir, and cedar. There are two noticeable cultivated farms on the shore about 3 miles to the northward of the point. The point is so rounding that it is not easily recognized on coming from the westward, but from the S. and N. it is well marked and prominent. Its face is composed of loose yellow sand, which, being blown up the hill by the strong W. winds, has formed a very peculiar ridge on the outer face of the top. This is so narrow that it can hardly be traveled; and in many places it is 35 feet above the ground inside; yet being overgrown with bushes, the ridge is now permanent.

The highest part of the point is about 260 feet above low water.

Although the water off this point is quite bold, yet the bottom drops off so suddenly that in foggy or smoky weather vessels running by the lead may be unexpectedly upon a bowlder reef which extends out ½ mile from the point and is marked by kelp very nearly to that depth. Southeast of the point the ten-fathom curve is less than ½ mile off shore, but off the point and to the northward the ten-fathom curve is fully ¾ mile from the shore. The line of the shore S. of the point runs E SE. and W NW. and in line with the direction of Partridge Bank, so that the ten-fathom lines are hardly 1 mile apart, yet there is a depth of 30 fathoms in that width.

Off the end of the bowlder reef in 5 to 10 fathoms the currents are very strong, and there is much boiling and overfall at the changes.

## BARCLAY SOUND, VANCOUVER ISLAND.

To mark the outer end of the bowlder reef, which lies close under the shore of Point Partridge, a *second-class nun buoy painted red and numbered 2* has been placed in 31 feet of water just outside the kelp and about  $\frac{1}{2}$  mile W. of the extreme outer part of the point. Vessels passing northward under the western shore of Whidbey Island must leave it on the starboard hand. A vessel coming from Rosario Strait to Admiralty Inlet must have it on the port hand.

From this buoy the following bearings and distances to prominent objects locate it:

Smith's Island light-house.....	NW. $\frac{1}{2}$ W., 6 miles.
Buoy on Partridge Bank.....	W. by N. $\frac{1}{2}$ N., 2 $\frac{1}{2}$ miles.
Point Wilson light-house.....	SE. by S. $\frac{1}{2}$ S., 5 miles.
Admiralty Head light-house.....	SE. by E. $\frac{1}{2}$ E., 5 $\frac{1}{2}$ miles.

## VANCOUVER ISLAND, BRITISH COLUMBIA.

This is the great island whose western shore for 200 miles continues the western coast beyond the limits of Washington. The southern end of the island forms the northern shore of the Strait of Fuca.

## LIGHT-HOUSE AT CAPE BEALE, BARCLAY SOUND.

From Tatoosh Island the mountains of the Sommerset Range on the coast of Vancouver Island are readily seen. They rise to over 2,000 feet elevation and mark the approach to Barclay Sound from the E SE. The opening to that sound is 14 miles wide and is open directly to the S. There are two wide entrances to it, separated by an archipelago of islands. The cape at the SE. point of the entrance through the Hecate Passage is Cape Beale, upon the extremity of which is built the light-house.

The structure is a square tower, painted a light stone color, and the keeper's dwelling is a detached oblong building, painted the same color.

The illuminating apparatus is of the first order, revolving, and shows a *white light at intervals of 30 seconds*, making a complete revolution in 2 minutes. It was first exhibited on July 1, 1874. The Hydrography List, page 262, says: "Visible thirty seconds; eclipse thirty seconds."

The height of the tower from the base to the center of the lens is 35 feet, and the focal plane is 164 feet above the high-water level of the sea; and in favorable conditions of the weather should be seen from a height of 15 feet, 19 miles.

The approximate geographical position is:

Latitude .....	48° 47' 48" N.
Longitude .....	125° 12' 52" W.

In January, 1885, the magnetic variation was 23° 50' east, and had very nearly reached the eastern maximum.

The light is visible from an easterly bearing parallel with the coast, round to W. by N.  $\frac{1}{2}$  N. It should not be brought to the eastward of E.  $\frac{1}{2}$  N., because foul ground extends off the entrances to Barclay Sound. The front of the cape is closely bordered by rocks, but a depth of 15 fathoms of water is found 1 mile off shore. *Mariners, however, should not attempt to enter the sound at night without local knowledge or a pilot.*

From this light Tatoosh Island light-house bears SE. by E.  $\frac{1}{2}$  E., distant 30 $\frac{1}{2}$  miles.

## BONILLA POINT, VANCOUVER ISLAND.

This is a moderately low point heavily wooded to the water's edge, but is backed by wooded mountains reaching 2,500 feet elevation within 6 miles of the shore. It is not made out by vessels entering the strait, but is seen as a low point with slowly rising background when a vessel is 20 to 25 miles inside the strait. It is 12 $\frac{1}{2}$  miles N NW.  $\frac{1}{2}$  W. from Tatoosh Island light-house.

The chart shows a small rock and reef close to the shore of the point, with kelp thence to the Carmanah Cove to the westward. In the NW. angle of this cove there is an Indian village.

The approximate geographical position of Point Bonilla is—

Latitude .....	48° 35' 30" N.
Longitude .....	124° 44' 00" W.

Westward from Point Bonilla the shore-line has a general direction W.  $\frac{1}{2}$  N. for 22 $\frac{1}{2}$  miles, to Cape Beale light-house. Eastward the shore-line is almost straight to Race Rocks light-house, W.  $\frac{1}{2}$  N. 50 $\frac{1}{2}$  miles. In 40 miles this shore is broken only by San Juan Harbor; the shore-line is backed by broken, rocky cliffs, usually not more than 50 feet high, and behind these the country rises in long slopes to high mountains that reach 3,000 feet in height, and perhaps more. The whole is densely wooded from shore-line to mountain-top, and only here and there are there any signs of small valleys to break the uniformity of the forest of firs.

The depth of water along this shore is quite great, but not equal to that under the southern shore of the strait. From Bonilla Point to the Sombrio River the ten-fathom line is generally less than  $\frac{1}{2}$  mile from the shore; eastward of that it reaches out as much as 2 miles in two places before reaching Sherringham Point, where the deep water again comes close under the cliffs.

Vessels are apt to lose much of the wind when close under either shore, and the currents are strong, but stronger under the American side. When beating into the mouth of the strait we have found a strong ebb current across the whole breadth that averaged more than 3 miles per hour. The deep channel, carrying over 100 fathoms of water, which comes through the strait, reaches a little farther west than Point Bonilla, and then turns sharply to the SSW., running S. of the latitude of Cape Flattery.

The *landfall* behind Point Bonilla is the mountain called "House Cone," which rises to a height of 2,500 feet. It is 7 miles from the nearest shore, and bears NE.  $\frac{3}{4}$  N. 9 miles from the point, and NE. by N. 8 miles from Owen Point at Port San Juan. It is in—

Latitude ..... 48° 29' 40'' N.  
Longitude ..... 124° 32' 30'' W.

Point Bonilla light-house.—The site which has been selected by the Canadian government for a light-house at this point is on a projection of the land a little to the westward of the point, where a landing can be secured.

#### PORT SAN JUAN, VANCOUVER ISLAND.

This is the first break in the uniform shore-line of the north shore of the Strait of Fuca inside the entrance. The middle of the mouth of the port bears NNE.  $\frac{2}{3}$  E. 13 $\frac{1}{2}$  miles from Tatoosh Island light-house.

The mouth is 1 $\frac{3}{4}$  miles wide, and the harbor maintains a width of 1 $\frac{1}{4}$  miles, with a general direction NE. by N. for 4 miles to the head. So the harbor is broad open to the heavy southwesterly swells of winter.

Tatoosh Island light-house is plainly visible from the harbor. When the port is seen from the entrance of the strait in clear weather, but with all the high wooded mountains of Vancouver Island in cloud, the entrance to San Juan Harbor is like a broad passage between high wooded hills on each side, while to the eastward is seen the depression through which the Sombrio River comes from the northward and eastward.

The two points at the entrance of the port lie W.  $\frac{1}{2}$  S. and E.  $\frac{1}{2}$  N. from each other. That to the W. is named Owen Point; it is a low, rocky point with rising wooded ground behind it. Outside of it a little more than 200 yards there is a low, flat rock *awash* at high water. It is named Owen Rock. The eastern point is named San Juan; it is a low, rocky projection, and the land rises very slowly behind it.

Inside of this point and under the NW. shore of the bay foul ground and rocks extend for 1 mile to the NE. One *sunken rock*, visible at the lowest tides, lies NE.  $\frac{1}{4}$  E. 800 yards from the point and 275 yards from the nearest shore. About 250 yards outside of the point toward Cape Flattery are the *Observatory Rocks*, high pinnacles with a few trees growing on them. Smaller rocks lie close outside the pinnacles.

Inside the point about  $\frac{1}{2}$  mile and 250 yards off the rocky shore there is another reef, partly out of water; it is named Hammond Reef.

The shores of the bay are steep, high, and rocky, and backed by heavily timbered hills and mountains. In very clear weather it is difficult to distinguish the entrance at a distance, unless one is acquainted with the locality, but in moderately hazy weather the indentation is readily made out.

The head of the bay terminates in a slight receding beach of muddy sand. Into the northernmost angle of the bay the Gordon River empties through the NW. end of the beach. On this river is a large Indian village called Onismah. Cooper Inlet opens into the northeastern angle of the bay at the SE. end of the beach. Very small coasters may enter these streams toward high water, and find depth and shelter within. Across the entrance of the port a depth of 10 fathoms is found, except near Observatory Rocks, close to which 17 fathoms of water are found. Outside the entrance to the port we find from 15 to 20 fathoms, and inside the bottom is very regular in 7 to 10 fathoms up to the head, where it decreases evenly to 4, within  $\frac{1}{2}$  mile of the beach at the head, from which a flat extends out 600 yards. The bottom is fine, muddy sand. The eastern side of the port has the least number of rocks, and a mid-channel course clears everything well. In moderately heavy southerly weather a heavy swell rolls straight in, and the swell breaks when it reaches depths of four fathoms.

Although it is probable a vessel with good ground-tackle would ride out a gale if anchored in the most sheltered part, it is by no means recommended to remain there with any indication of such weather, but to weigh immediately, and if outward bound to seek shelter in Neesh Bay, the entrance to which bears from San Juan S. by W. 10 $\frac{1}{2}$  miles distant. Good anchorage will be found about 1 $\frac{1}{2}$  miles from the head of the bay, with Owen Island bearing SW., and Adze Head, on the opposite shore, bearing ESE., in 7 fathoms. (Richards.)

The experience of the American lumber vessels sailing to this strait warns them never to approach the northern shore of the entrance, for the peculiar set of the currents and the large, heavy swell which gets up without warning and in a calm, gives them small chance from going ashore.

The approximate geographical position of Observatory Rocks is—

Latitude ..... 49° 31' 30'' N.  
Longitude ..... 124° 28' 15'' W.

The coast-line eastward from Port San Juan is almost unbroken to Sherringham Point, distant  $23\frac{1}{2}$  miles exactly E. The shore is moderately low, rocky cliffs without beach, and backed by densely wooded, rising hills.

It is notable that there are no bright cliffs, but the forest comes down to the water's edge, and there appears no sign of extensive forest fires.

Providence Cove is a slight indentation nearly 3 miles E. of Point San Juan. It is open to the S SE., and at its head receives a small mountain stream. It is only fit for boats. Half a mile outside of it the depth of water is 20 fathoms.

Sombrio Cove.—At  $7\frac{1}{4}$  miles E. from Point San Juan is the eastern point of a recession of the shore-line for  $\frac{1}{2}$  mile to the northward. It is a bight broad open to the southward. It receives a small stream called Sombrio River, coming in from the eastward, off the mouth of which is an extensive reef. There is a depth of 10 fathoms within  $\frac{1}{2}$  mile of this reef. From the eastern point of this cove the twenty-fathom line begins to stretch off shore nearly 2 miles and then runs eastward nearly parallel with the shore to abreast the opening of the Jordan River, when it moves into Sherringham Point.

There is a small rocky islet close to the point of the Sombrio bight; 2 or 3 miles east of Sombrio River there is a piece of broken and exposed cliff, and this is not a usual feature along the north shore.

The River Jordan is  $17\frac{1}{2}$  miles E. from Point San Juan, and nearly 6 miles W. from Sherringham Point, with an intermediate point projecting outside of Sherringham Point. The river is said to be a considerable stream coming from the high, wooded hills, and there are large deposits of abraded material on each side of the entrance.

Vessels working up the strait at night and bound for Victoria or the Canal de Haro must be careful not to approach the N. shore so as to shut in Race Island light by Beechey Head. The light is first visible just westward of Sherringham Point.

Nearly 3 miles west of Sherringham Point there is an unnamed point projecting out when a vessel is close inshore; the shore recedes  $\frac{1}{2}$  mile on the western side, and a hill lies nearly 1 mile to the northward.

Sherringham Point.—This is a rocky point with rocks under it, and very deep water within  $\frac{1}{4}$  mile. The forty-fathom line is within less than  $\frac{1}{2}$  mile from the point. It is 33 miles E NE. from Tatoosh Island light-house, and almost abreast of Pillar Point, from which it bears N. by E.  $\frac{1}{4}$  E., distant 12 miles. It is not intervisible with Race Island light-house, but the distance of the latter is 16 miles E.  $\frac{3}{4}$  N.

There is a sharp rocky ridge covered with fern 150 to 250 yards wide running northward from the point for about  $\frac{1}{2}$  mile, and rising to a height of 560 feet; it has a sharp gulch on each side, and therefore stands out prominently and is notable from seaward. Two or 3 miles to the NW. of the point there is a high, densely wooded mountain. Very frequently, in passing through the strait, all the lower part of the land on either side will be clear, but the mountains will be hidden in cloud.

This point, both for its height and the bare ridge, is more notable than the points to the E. and to the W.

Eastward of Sherringham Point the shore recedes nearly 1 mile to the N. in a long curve, to Otter Point, which is a little over 4 miles E.  $\frac{1}{2}$  N. from the former. On the line of these points the depth of water reaches 20 fathoms, but decreases rapidly to 3 fathoms, which, on the eastward side of the point and within  $1\frac{1}{2}$  miles of Otter Point, reaches  $\frac{3}{4}$  mile off shore. In  $1\frac{1}{2}$  miles E. of Sherringham Point there is a small field of kelp. A few small streams enter this broad bight.

Otter Point, Sooke Bay.—This is a sharp, rocky point, around which are clustered a good many rocks; but outside these dangers the bottom drops to 20 fathoms in less than  $\frac{1}{4}$  mile.

Behind this point the land rises in a long, wooded ridge running northward, but it is not near so prominent a point as Sherringham, nor so high.

Between Otter Point and Secretary Island the course is E.  $\frac{3}{4}$  N. for  $4\frac{1}{2}$  miles, and on this line the depth of water is as much as 35 fathoms, but decreases rapidly toward the shore.

Eastward of the point there is a moderately deep bight, which at its eastern angle forms the entrance to Sooke Inlet. It is called Sooke Bay, and at  $2\frac{1}{2}$  miles NE. from Otter Point, in the deepest part of the bay, there is a good watering place at a break in the cliffs.

Vessels may anchor in this bay in fine weather in 8 to 10 fathoms of water at  $\frac{1}{2}$  mile from the shore, but there is reported to be a rocky patch a little over  $\frac{1}{2}$  mile to the E NE. of Otter Point with a depth of 5 fathoms inside of it. In leaving this bay a vessel must have plenty of wind and have watchful care for the currents.

#### SOOKE INLET, VANCOUVER ISLAND.

From Sherringham Point to Beechey Head the distance is  $11\frac{1}{2}$  miles and the bearing E.  $\frac{1}{2}$  N. We have already described the indentations between Sherringham Point and Otter Point, and between Otter Point and Secretary Island. In the eastern angle of the latter indentation is the mouth of the very crooked, narrow entrance called Sooke Inlet leading to the large land-locked sheet of water named Sooke Basin.



One mile to the southeastward of this entrance there is a large rocky islet, known as *Secretary Islet*, lying apparently one width or 150 yards off the rocky front of *Point Possession*, but in reality it is 400 yards off. As seen from the strait it is a brown, bare islet rising with long sloping sides. It has a rocky face and a lower point on the outer or southern side. There are bushes and low scrub on the eastern side, and on the **SW.** slope there are no bushes. The English chart says it is 120 feet high, but it does not seem so. There is deep water close to the outer side, and even between it and the point there is a depth of 25 fathoms.

This large islet is a good landmark for making the Sooke Inlet from the **W.**; there is a broken bright yellow cliff estimated to be from 80 to 100 feet high westward of the inlet and about  $\frac{1}{4}$  mile long. As there is no other bare broken cliff on the northern side of the strait except 2 or 3 miles **E.** of Sombrio River, this mark is notable. From this yellow cliff a low sand spit makes out **NE.** for  $\frac{1}{2}$  mile across the entrance to Sooke Inlet. To the eastward of this spit is the passage which is only 100 or 200 yards wide, with an irregular rocky bottom and some sunken rocks. The currents run with great velocity, and a thorough knowledge of these and the channel is necessary to enter this place. When a depth of 10 fathoms is struck off the entrance, a high hill, named Mount Maguire, will bear about **NE.** It is 940 feet in height and is partially covered with scrubby oak trees, but the bare rock shows distinctly in many places, and this feature now commences to distinguish the **SE.** part of Vancouver Island. The English chart of the inlet and basin will give the necessary directions. The place is only adapted to small coasting vessels or small steamers. They may anchor outside the kelp in 10 fathoms of water, or in an emergency, run in and anchor in the little basin on the **N.** side of Whiffen Spit.

*Mount Maguire*, already mentioned, is quite a landmark on this shore, because it is the first mountain made on the Vancouver coast, in coming from the westward, which is not covered with a dense growth of the Oregon fir. It is 940 feet high, lies only  $1\frac{3}{4}$  miles back from Point Possession, and is noticeable as being covered with scrub oak and other stunted trees, through which the bare rocks protrude. It lies  $6\frac{3}{4}$  miles **W.**  $\frac{3}{4}$  **N.** from Race Island light-house.

**Beechey Head.**—This is the rounding rocky point nearly 5 miles **W SW.**  $\frac{7}{8}$  **W.** from Race Island light-house. It rises rapidly from the water to about 300 feet with the pine forest dense on the western side, a scrubby growth of pines on top, and bare brown rocky patches showing through the trees on the **S.** face. There is no rock off the face of the point. Three miles to the westward of it is the entrance to Sooke Inlet, and on its eastern side is Beecher Bay. Behind it the land rises for  $2\frac{3}{4}$  miles to Mount Maguire, 940 feet high, and lying **NW.** from the point. The shore is bare and rocky in patches, with openings of land covered with fern and destitute of trees; and the houses or settlers are here and there located in pleasant nooks. The higher hills are wooded, with bare areas of rock showing through.

Off the head the depth of water is very great and 20 fathoms is found at 100 yards from the craggy face of the point. The currents are very strong and irregular at the change of the tide. In this vicinity a United States revenue-cutter during densely smoky weather reported touching the bold shore with her flying jib-boom, and only struck her forefoot after the jib-boom had been carried away.

In the older charts at 2 to 3 miles **SSE.** from Beechey Head depths of 150 fathoms are given, but the latest examinations report only 104 fathoms.

The approximate geographical position of Beechey Head is:

Latitude .....	58° 18' 30'' <b>N.</b>
Longitude .....	123° 39' 27'' <b>W.</b>

#### BEECHER BAY, VANCOUVER ISLAND.

This bay lies to the eastward of Beechey Head, with Cape Church or Smith Head and the rocky islets off it for marking the eastern point. These islets are wooded and named the *Bedford Islets*.

**Cape Church** is the outer point. Two rocky islets are so close under the cliff that they are not distinguishable from it when a vessel is 1 or 2 miles outside. Hence for 1 mile to the **WNW.**, to Smith Head, there are 3 or 4 rocky islets. The outer one is about 25 feet high, and bare rock; the inner one is bare rock, and 5 or 10 feet high.

The entrance of this bay is  $1\frac{1}{2}$  miles wide, and it runs back with the same width for  $1\frac{1}{2}$  miles. The shores are very rocky and jagged, and guarded on the eastern side by many rocky islets. Two large islets lie in the northern part of the bay. The one in the **NE.** angle is Frazer Island, and that in the **NW.** is Wolf Island. The passage to the anchorage is between these two islets, with 20 fathoms of water, and after passing Frazer Island the course is northeasterly for  $\frac{3}{4}$  mile, where anchorage is had in 10 fathoms, with the center of Frazer Island bearing **SSW.**, distant  $\frac{1}{4}$  mile.

The bay is inclosed by rocky hills, but it cannot be recommended as a good anchorage.

It affords no great shelter, with a southerly or westerly wind, and vessels outward bound had better wait a fair wind in Parry Bay, four miles to the north-northwest of the Race Rocks.

Vessels bound up the strait should pass the land about Beechey Head at a distance of two miles if intending to go outside the Race Islands. (Richards.)



## RACE ROCKS, VANCOUVER ISLAND.

**Mount Miles.**—This is a moderately high, round-topped hill lying within  $\frac{1}{2}$  mile of the shore just E. of Cape Church. It has probably been burnt over and shows no trees for  $\frac{2}{3}$  of its height from the summit on its SW. face; but a straggling forest lies on the western slope more than half way up, and another clump on the northerly side near to the summit. It is a feature in the approaches to the Race Rocks, and lies 2 miles W. by N. from Race Island light-house. It is 500 or 600 feet high.

## THE RACE ROCKS OR RACE ISLAND, VANCOUVER ISLAND.

These small rocky islets lie close off the southeasternmost point of Vancouver Island, at the eastern part of the Strait of Fuca, where it opens toward the N. and E. to nearly double its general width. At this point they seem to contract the width of the channel fully  $1\frac{1}{2}$  miles, and at the same time form a danger on a route of large traffic. The strait is here at its narrowest part, being only  $7\frac{1}{2}$  miles wide between the outermost danger of the Race Rocks and the shore-line at Point Angeles, which lies S. by E.  $\frac{1}{2}$  E. therefrom. From the Race Rocks the shore-line takes a northerly direction for 8 miles, to Esquimalt and Victoria harbors, etc.

This cluster of small rocky islets numbers about 10 principal ones, which are embraced in an area about 1 mile long NW. and SE. and  $\frac{1}{2}$  mile wide. They are quite low, and the larger ones are covered with grass, but without trees or bushes. The largest is about 300 yards in extent and 25 feet above the sea. The innermost islet lies  $\frac{1}{2}$  mile from the nearest point of Bentinck Island, which is a low wooded island 1 mile long close under the Vancouver shore. Through this half-mile passage there is very broken bottom from 30 to 6 fathoms, with strong, irregular currents. The outermost visible rock outside the light-house is a little over 1 mile from Bentinck Island, but stretching southeastwardly therefrom for  $\frac{1}{2}$  mile the bottom is very irregular with two points of *sunken rocks*. The outer one of these dangers is the *Rosedale Rock*, having only 5 feet of water upon it; it lies  $\frac{2}{3}$  mile SE. by E. from the light-house. Outside of this danger the depth of water drops off to 20 fathoms to the southward, but toward the E. for  $\frac{1}{2}$  mile a ridge has partially developed having 6 to 8 fathoms of water upon it. This outer sounding of 8 fathoms is  $\frac{2}{3}$  mile E. by S.  $\frac{1}{4}$  S. from the light-house.

The currents rush around and through the islets and over the reefs with great velocity and irregularity as we have measured. In light airs a sailing vessel must give these dangers a wide berth, especially if the current is ebb, because it sets strongly toward them. Sailing vessels have drifted upon the rocks in a calm, and there is little chance for escape. In bad weather the current rips are dangerous.

There is kelp among the islets on the NW. side toward Bentinck Island.

## LIGHT-HOUSE ON THE RACE ROCKS.

The tower on the great Race Rock is the frustum of a cone rising about 100 feet above the rock and 118 feet above high water. The keeper's dwelling house is of stone and two stories high; it lies on the landward side of the tower and close to it. The roof of the dwelling is nearly on a level with the middle of the lowest black band. One or two small white buildings are on the NE. part of the rock.

The illuminating apparatus is of the second order. It is a *white light which shows a bright flash every 10 seconds*.

Under favorable conditions of the atmosphere it should be seen from a height of 15 feet, a distance of 17 miles.

The geographical position of the light-house was determined by the U. S. Coast and Geodetic Survey, as follows:

Latitude..... 48° 17' 53".5 N.  
Longitude..... 123° 31' 47".0 W.

The magnetic variation for January, 1886, was 22° 37' E. with no annual change, as the variation has reached its maximum.

From the Race Island light-house we have the following bearings and distances to important objects:

Tatoosh Island light-house .....	W SW. $\frac{1}{4}$ W., 48 $\frac{1}{2}$ miles.
Pillar Point .....	SW. $\frac{1}{4}$ W., 23 $\frac{1}{2}$ miles.
Ediz Hook light-house .....	SE. $\frac{1}{4}$ E., 11 miles.
New Dungeness light-house .....	East., 18 miles.
Point Wilson light-house .....	E. $\frac{1}{4}$ N., 32 $\frac{1}{2}$ miles.
Admiralty Head light-house .....	E. $\frac{1}{4}$ N., 35 miles.
Smith's Island light-house .....	NE. by E. $\frac{1}{4}$ E., 27 $\frac{1}{2}$ miles.
S. W. Island off Watmough Head, Rosario Strait.....	NE. $\frac{1}{4}$ E., 29 miles.
Discovery Island light-house .....	NE. $\frac{1}{4}$ N., 14 $\frac{1}{2}$ miles.
Victoria light-house .....	N. by E. $\frac{1}{4}$ E., 9 $\frac{1}{2}$ miles.
Esquimalt light-house .....	N. $\frac{1}{4}$ E., 8 $\frac{1}{2}$ miles.

**Fog-signal.**—The fog-signal at this light-house is a twelve-inch *steam fog-whistle*. It is placed close under the SE. side of the light-house, and is sounded during foggy and smoky weather with "blasts of 5 seconds duration, with intervals of 1 minute and 12 seconds between the blasts."

**Race Rocks Passage.**—There is a clear passage of  $\frac{3}{4}$  mile in width between the innermost of the Race Rocks and the rocky shore of Bentinck Island toward the NW. It has a bottom of very variable depth from 30 to 6 fathoms.

Small steamers from the westward, entering to take this passage, should pass within half a mile of Cape Church and keep the land aboard at that distance until up with Bentinck Island (which will be made out as separated from the Vancouver shore by a narrow channel full of rocks), when Bentinck Island should be approached to within one-fourth of a mile, or just outside the kelp.

Strong currents run through this passage and with much irregularity. When the current is ebb some of the large steamers from Victoria bound out of the strait run through the passage and pass it in 10 minutes.

Under ordinary circumstances a sailing vessel should not approach this passage or the Race Rocks within 1 mile.

A case may arise, however, either inward or outward bound, when a vessel overtaken by a strong SE. wind would do better to run through than risk weathering the great Race Rock by less than 1 mile; if so the Bentinck Island shore should be kept aboard at the distance of two cables, or just outside the kelp-line (on that side of the passage), for the northernmost rock, which forms the southeastern side of the passage, is covered at high water, and the strongest tides [currents] and eddies are found in its neighborhood. The course through is N NE. and S SW. (Richards.)

#### DIRECTIONS FOR ESQUIMALT AND VICTORIA HARBORS FROM THE RACE ROCKS.

The general direction of Esquimalt Harbor from Bentinck Island inside Race Rocks light-house is N.  $\frac{1}{4}$  E., and the distance is  $8\frac{1}{2}$  miles; from Esquimalt Harbor to Trial Island the course is E.  $\frac{1}{2}$  N., and the distance is 6 miles, but the two are not intervisible.

Along the shore between Esquimalt Harbor and Bentinck Island and from Trial Island the current runs out with great velocity with a general set toward the Race Rocks. The depth of water in this open gulf averages 40 fathoms.

The light-house tower of the Race Rocks can be distinctly seen at a distance of 12 miles, so that it is readily seen from the open gulf hence to Trial Island. We have already given special directions for avoiding the dangers that surround them.

Vessels bound to Esquimalt Harbor and clearing the Rosedale Rock by  $\frac{1}{2}$  mile will open Esquimalt Harbor bearing N.  $\frac{3}{4}$  W., distant  $8\frac{1}{2}$  miles. As the white tower at Esquimalt entrance is nearly 60 feet high it is readily seen in clear weather and a course may be laid from it. If bound for Victoria Harbor the light bears N.  $\frac{1}{2}$  E., distant  $9\frac{1}{2}$  miles.

#### ESQUIMALT HARBOR, VANCOUVER ISLAND.

This excellent bay is where all the British men-of-war lie, and it contains a small naval dock-yard in the southern part of Constance Bay, called Royal Bay. The entrance is  $\frac{1}{4}$  mile wide, and has two rocky heads on either hand, the western head having Fisgard Island and the light-house off it, and the eastern having the outlying Scrogg sunken rocks south of it, with several islets. From the entrance the general direction of the bay is N NW., and the extreme length 2 miles; the average width is  $\frac{1}{2}$  mile. After passing the heads the harbor opens to the E., forming a small, beautiful bay, called Village Bay or Constance Cove (sometimes Man-of-war Cove), where men-of-war anchor in a uniform depth of 6 fathoms. In the entrance are 7 and 8 fathoms of water, and the approaches for 1 mile give from 10 to 13 fathoms.

(For the details of Esquimalt Harbor, the dangers, etc., see the Vancouver Island Pilot.)

At the head of the harbor is Mount Seymour, 460 feet high.

Inland and 5 miles W. of the head of Esquimalt Bay is the head of a large bay coming from the northward and opening into the inside channel to the Nanaimo coal mines.

**The light-house at Esquimalt Harbor.**—This light-house is erected on Fisgard Island, a small, rocky islet, 25 feet above the water. The islet is almost connected with the shore, and forms the western point of the entrance to Esquimalt Harbor. The eastern point is Duntze Head, and the entrance is only 600 yards wide, but the bay opens out beautifully inside.

The structure consists of a round tower of brick, whitewashed and elevated 57 feet above the rock, with a red brick keeper's dwelling adjoining. The tower is surmounted by a lantern painted red. As seen from the approaches it shows as a tall, white, slim tower projected against the dark, fir-covered bluffs behind it.

The illuminating apparatus is of the fourth order, and shows two colors in different parts of the arc, with a large arc eclipsed.

The total arc of visibility is  $227^{\circ}$ . Of this the *white light* shows from S.  $3\frac{1}{2}^{\circ}$  E., just clearing Rosedale Rock to the southeastward of Race Rocks light-house, round to S.  $60^{\circ}$  E. Then the *white light* changes to a *red light* from S.  $60^{\circ}$  E. round through E. and N. to N.  $9\frac{1}{2}^{\circ}$  W. inside the harbor. At this bearing the *red light* changes to a *white light*, which shows from N.  $9\frac{1}{2}^{\circ}$  W. to N.  $51\frac{1}{2}^{\circ}$  W. and is then eclipsed. The *eclipse* of the light extends from N.  $51\frac{1}{2}^{\circ}$  W. round by W. over the land through S. to S.  $3\frac{1}{2}^{\circ}$  E., just E. of the Rosedale Rock, where the *white light* begins.

The focal plane of the light is 70 feet above the level of the sea at high water, and in favorable states of the atmosphere should be visible from a height of 15 feet, 14 miles.

## VICTORIA HARBOR.

The geographical position of the light-house, as determined by the U. S. Coast and Geodetic Survey, is—

Latitude .....	48° 25' 49".9 N.
Longitude .....	123° 26' 46".4 W.

This light is known as the Fisgard Island light on the English charts.

It will be seen from the foregoing description of the light that its characteristics have been changed from the original system.

When a vessel is coming up the strait from the westward bound to Victoria or the Haro channel, the fixed white light of Esquimalt Harbor will be seen so soon as the vessel is to the eastward of the Rosedale Rock off the Race Rocks light-house. The light should be steered for on the bearing **N.  $\frac{1}{2}$  W.**, which will lead close to the reef extending a short distance off Albert Head, which is  $5\frac{1}{2}$  miles **N.  $\frac{1}{2}$  W.** from Race Island light-house. While a vessel keeps the white light of Esquimalt in full view she is clear of all known dangers to the westward. If she gets too far to the westward the light will be lost, and she should immediately steer to the eastward till it is again seen. This precaution is necessary on account of the currents which during spring tides run as much as 6 knots an hour in the neighborhood of the Race Rocks. The ebb current runs almost in a direct line from the Canal de Haro to the rocks, and sets between them and the shore with great force and irregularity.

When to the northward of Albert Head, and wishing to anchor in Royal Bay, at the approach to Esquimalt Harbor, a vessel should bring Esquimalt light to bear **N. by W.**, when she will have 10 fathoms, with good holding ground, about 1 mile from the light; or, if desired, she may stand to the westward until the white light is lost, when she should *immediately* anchor.

In entering Esquimalt Harbor the light changes from *white* to *red* when it bears **NW. by W.  $\frac{1}{4}$  W.**, and it should be left from 300 to 400 yards on the port hand to clear a reef and sunken rock extending 170 yards to the northwestward of the light. The depth of the water in the approaches and in the entrance is 8 to 10 fathoms over a very regular bottom. Inside, when the red light bears **S. by W.**, a ship may anchor in 7 fathoms or stand into Constance (or Man-of-war) Cove, carrying 6 fathoms over a level bottom of mud. When inside the harbor and the light bears **S.  $\frac{3}{4}$  E.** the red light changes to a white light to the westward, where the shoal off Yew Point, and the sunken danger, Whale or White Rock, may bring a vessel up.

The *red light* is useful to vessels bound to Victoria or Esquimalt Harbor from the eastward. After a vessel rounds Trial Island bound for Esquimalt Harbor, a **W SW.** course will lead a safe distance outside of Brotchy Ledge and bell-buoy, and should be continued until the Esquimalt light changes from *red* to *white*, when it may be steered for, and not before. At this change the light bears **NW. by W.  $\frac{1}{4}$  W.**, and that course passes 140 yards outside of the outermost danger of Scrogg Rocks, which are within  $\frac{3}{4}$  mile of the light-house.

Fisgard Island has kelp around it, and in daytime the line of safety is just outside this kelp, which extends 100 yards toward the channel. On the edge of this kelp is a *sunken rock* with 7 feet of water on it, 175 yards **NE.** from the light-house.

For details of the harbor, anchorage, winds, currents, etc., see Vancouver Island Pilot, and Admiralty chart, 576.

*Tides at Esquimalt Harbor.*—The Admiralty chart, 576, gives the following data about the tides: It is high water at the full and change of the moon from May to October between midnight and 3<sup>h</sup> next morning; and from November to April from noon to 3 p. m. The spring tides rise 7 to 10 feet, and the neap tides rise 5 to 8 feet; with strong winds from the **SW.** and **SE.** the tides rise 2 feet above ordinary spring-tides. It will be better to take the tides from Tide Tables for the Pacific Coast, published annually by the U. S. Coast and Geodetic Survey.

From Esquimalt Harbor light we have the bearings and distances to the following important points:

Race Rock light-house .....	S. $\frac{1}{4}$ W., 8 $\frac{1}{2}$ miles.
Ediz Hook light-house .....	N NE. $\frac{1}{4}$ E., 17 $\frac{1}{2}$ miles.
New Dungeness light-house .....	E SE., 20 miles.
Point Wilson light-house .....	E. $\frac{1}{4}$ S., 32 $\frac{1}{2}$ miles.

**Victoria Harbor, Vancouver Island.**—The general precaution for the approach to Victoria Harbor upon rounding Race Rocks may be taken the same as for Esquimalt Harbor.

The course for the entrance to Victoria Harbor, after rounding the Race Rocks light-house, is **N.  $\frac{3}{4}$  E.**, and when Esquimalt light changes from *bright white* to *red* a vessel will be 1 mile from the shore in 33 fathoms of water over sandy bottom.

Ships above the size of coasters, unless acquainted with the locality, are recommended not to run for Victoria at night, when they cannot enter, but rather to anchor in Royal Bay for daylight. The limit of anchorage there, when a vessel stands to the westward, is to anchor *immediately* when the bright white light is eclipsed. This will give 10 fathoms of water over mud within 1 mile of Esquimalt light-house. With southeasterly and stormy weather a ship bound for Victoria should immediately run into Esquimalt Harbor, which she can easily do with the assistance of the light-house on Fisgard Island.

The entrance to Victoria Harbor is  $2\frac{1}{2}$  miles E. of Esquimalt. As the channel is very contracted, crooked, and obstructed with a nine-foot bar, vessels usually anchor outside in 10 or 15 fathoms of water, taking care to avoid Brotchy Ledge, with only 5 feet of water upon it. This danger lies about  $\frac{1}{2}$  mile S SE. from the eastern head, and SW.  $\frac{3}{4}$  W. from Mount Beacon, upon which was a range mark with one on the immediate shore. It is 1 mile S SE.  $\frac{3}{4}$  E. from Victoria light-house. The ledge is marked by a white spar-buoy just SW. of the rock. The channel inside is well marked out by buoys, but a pilot is necessary to carry a vessel in. The whole length of the harbor is about 3 or 4 miles, with an average width of  $\frac{1}{2}$  mile. It is very tortuous, and the head stretches W. nearly to the head of Esquimalt Bay, where a portage exists.

The approaches to the harbor are deep outside of Brotchy Ledge, and from 10 to 20 fathoms of water are found inside of it. The shores adjacent are low, but rocky, and covered in part with trees, reminding one of the rocky parts of the coast of Massachusetts and Maine.

For details of Victoria see the Vancouver Island Pilot.

The ocean steamer wharf is now located on the eastern shore just inside the outer head and just outside the light-house (which is on the western side), so that these large vessels run directly toward it in coming from sea, and leave it without trouble.

#### LIGHT-HOUSE AT VICTORIA HARBOR.

About  $\frac{3}{4}$  mile inside the western point of the entrance to Victoria Harbor a light-house has been built on the western side in the narrowest part of the entrance, upon the second small rocky islet lying so far in that it can be seen over the bar inside and directly into the harbor. This islet is named Berens, and is about 15 feet above high water; there is a depth of 10 feet close to its SE. face.

The light-house structure is the frustum of a square pyramid. It is built of wood, and is 30 feet high from base to vane. It presents two windows on the seaward side. The lantern is on top of this tower, and it is painted red. There is a keeper's dwelling attached, and all are painted white.

The light is intended as a harbor light; it shows a *fixed blue light*, which is elevated 44 feet above high water. Under favorable conditions of the atmosphere this light should be visible at a distance of 6 or 7 miles.

**Fog-bell at the light-house at Victoria Harbor.**—There is a fog-bell at the Berens Island light-station at the entrance to Victoria Harbor. The bell is suspended from a roofed framework on the seaward side of the light-house tower, and will be rung by hand, but only in answer to steamers blowing their whistles on entering in thick weather.

There is a *white spar buoy* on Brotchy Ledge which lies  $1\frac{1}{10}$  miles SE. by S.  $\frac{1}{2}$  S. from the light-house. The danger has 5 feet of water upon it, and the whole ledge inside the three-fathom line is 175 yards in diameter, with 6 and 7 fathoms of water immediately around that area.

The geographical position of the light-house, as determined by the U. S. Coast and Geodetic Survey, is:

Latitude .....	48° 25' 26" N.
Longitude .....	123° 23' 30" W.

**Shoal Point Light.**—About  $\frac{3}{4}$  mile inside the entrance to Victoria Harbor the low, sharp, rocky point on the E. side, directly abreast the light-house on Berens Island, is named Shoal Point. Around the shoal ground making out to the north northwestward from this point the channel makes a very short turn to the east southeastward. On this point a *hand-lantern*, showing a *fixed red light*, has been established at an elevation of 5 feet above the water. It is attached to the framework beacon on the platform buoy which marks the outer end of the spit shoal point. It was first shown August 1, 1889, and will be maintained during the autumn and winter months until further notice. During stormy weather it may become extinguished at times, when it will be impossible to relight promptly.

**Buoy in Victoria Harbor.**—The *spar buoy* No. 7, inside Victoria Harbor, and which marked the Beaver or Spence Rock, 200 yards E. from Loughie's Point, has been permanently discontinued. There is now a depth of 9 feet of water on the rock at low water spring tides.

**Tides.**—The Admiralty Chart 576 gives the following data: It is high water at the full and change of the moon from May to October between midnight and 3<sup>h</sup> next morning; and from November to April between noon and 3<sup>h</sup> in the afternoon. The spring tides rise from 7 to 10 feet, and neaps 5 to 8 feet. With strong SW. and SE. winds the tides rise 2 feet above ordinary spring tides.

For the details of the approaches to Victoria Harbor, the currents, tides, winds, etc., see the Admiralty Chart 576, and Vancouver Island Pilot.

#### TRIAL ISLANDS, OFF VANCOUVER ISLAND.

This group of islands, generally showing as one, consists of two principal, bare, rocky islets lying close under the south shore of Point Gonzalez, which forms the extremity of the shore lying to the eastward of Esquimalt and Victoria harbors and near the west side of the entrance to the Haro Strait. The shore from Esquimalt and Victoria harbors to the Trial Islands is irregular, low, and rocky, with hillocks of 140 to 230 feet elevation. The general direction is E. The south end of the outer Trial Island is 6 miles almost exactly E. from Fisgard light-house,  $3\frac{1}{2}$  miles E.  $\frac{1}{4}$  N. from Brotchy Ledge buoy, and  $3\frac{1}{4}$  miles SW.  $\frac{1}{4}$  S. from Discovery Island light.

## DISCOVERY AND CHATHAM ISLANDS.

The outer and larger islet is  $\frac{1}{2}$  mile long and stretches out 1 mile from the shore into 14 fathoms of water, with a narrow line of kelp along its E. and W. sides, and deep water on the edge of the kelp. The outer end of the islet is about 80 feet high and is steep-to. The northern or inner islet is low, and foul ground exists close around it, although there is a narrow five-fathom channel behind it called the Enterprise Channel. The currents are strong past the islet, and heavy current-rips prevail, especially during the flood, which runs nearly 6 miles per hour at spring tides.

## DISCOVERY AND CHATHAM ISLANDS, OFF VANCOUVER ISLAND.

These two islands and the adjacent islets are quite close together, and cover an area of  $1\frac{1}{2}$  miles NW. and SE. by 1 mile broad. Chatham is the northwestern island, and they are connected by very dangerous ground. The outer or eastern point of Discovery Island is  $2\frac{1}{2}$  miles from the nearest point of Vancouver Island. Discovery Island has a very irregular outline; it is longest E. and W., and has broken, rocky shores guarded by many rocks and foul ground for as much as 400 yards. The island is a granite mass 121 feet high and partially covered with firs, through which the rock shows in large patches without a blade of vegetation.

To the northwestward of Discovery Island, and separated therefrom by a narrow and intricate channel full of rocks, lies Chatham Island (composed of several small islets), somewhat smaller in extent and not so high as Discovery Island, but similar in appearance and formation. Between these two islands and the Vancouver shore lies an extensive area called Gonzalez Sound, nearly filled with rocks and reefs, the main body being called the Chain Islands, which are about 30 feet high. Close around the western side of Discovery and Chatham and east of the Chain Islands is a channel known as the Plumper Passage, from 7 to 17 fathoms, but it is only fit for small craft. From the western part of Chatham Island to Cadborough Point the distance is about  $\frac{3}{4}$  mile. Numerous rocks show close to the point.

For details of the passage through Gonzales Sound and around the islands, see the Vancouver Island Pilot.

## LIGHT-HOUSE ON DISCOVERY ISLAND.

The structure is placed on the eastern extremity of the island just behind Sea Bird Point. The building is of wood, painted white, and consists of a square tower surmounted by a metal lantern; the height from the ground to the vane is 47 feet. The keeper's dwelling is attached to the tower.

The illuminating apparatus is of the fifth order, and shows a *fixed white light*. The arc of visibility extends through  $253^\circ$  from N.  $42^\circ$  W. round by the north, east, and south, to S.  $31^\circ$  W.; so that it shows through the Haro Strait, Sidney Channel, and the direction of Race Rocks.

The focal plane of the light is 91 feet above the high-water level, and under favorable conditions of the weather should be seen from a distance of 15 miles. Toward the southwestward the light is seen outside the Trial Islands.

The geographical position of the light-house is:

Latitude .....	$48^\circ 25' 20''$ N.
Longitude .....	$123^\circ 13' 50''$ W.

The magnetic variation in January, 1886, was  $22^\circ 38'$  east, and was then at its extreme limit.

From Discovery Island light-house we have the following bearings and distances to important objects:

Race Rocks light-house .....	SW. $\frac{1}{2}$ S., $14\frac{1}{2}$ miles.
Ediz Hook light-house .....	S. $\frac{1}{2}$ E., $18\frac{1}{2}$ miles.
New Dungeness light-house .....	SE. $\frac{1}{2}$ S., $15\frac{1}{2}$ miles.
Point Wilson light-house .....	E SE. $\frac{1}{2}$ E., 25 miles.
Admiralty Head light-house .....	E. $\frac{1}{2}$ S., 27 miles.
Hein Bank (three and one-half fathoms) .....	E. $\frac{1}{2}$ S., $8\frac{1}{2}$ miles.
Smith's Island light-house .....	E. $\frac{1}{2}$ N., $16\frac{1}{2}$ miles.
Davidson Rock (Rosario Strait) .....	NE. by E. $\frac{1}{2}$ E., $16\frac{1}{2}$ miles.
South Point of Salmon Bank (entrance to San Juan Channel) .....	NE. by E., $\frac{1}{2}$ E. $9\frac{1}{2}$ miles.
Kelp Reefs in Haro Strait .....	N NW. $\frac{1}{2}$ W., $7\frac{1}{2}$ miles.

A fog-horn operated by steam and compressed air has been established at the light station at Sea Bird Point. The horn will sound blasts of 8 seconds duration, with intervals of one minute between blasts. The fog-alarm building is situated about 300 feet southwesterly from the light-house and is of wood, painted white, with brown roofing. The horn is elevated about 45 feet above high-water mark.

*Tides.*—The high water at the full and change of the moon is irregular and much influenced by prevailing winds; the greatest rise and fall of the tide at Discovery Island is 12 feet. During summer months in the channels the flood stream commences at fifteen minutes past eleven a. m., running with great strength till nearly three p. m., after which but little tide is felt until four a. m. on the following day, when the ebb commences and runs till nearly eleven a. m., the time of low water by the shore. (Richards.)

## SMITH'S ISLAND, STRAIT OF FUCA.

The only island lying broadly in the Strait of Fuca is Smith's Island, near the eastern termination of the strait, within 6 miles of Whidby Island, and 7 miles broad off the southern entrance

to the Rosario Strait. It is quite small, not occupying half a square mile, and rises regularly from the eastern to the western extremity, where it attains a height of about 55 feet, with an almost perpendicular cliff of clay and gravel. When approached from Point Wilson and seen in the morning sun, the island shows a bright, low cliff with a black line on top and running down to the low point at the east. The light-house and buildings show white. It formerly sustained a few dreary looking trees, but none of great thickness or height, and the surface is covered with a growth of bushes 10 or 12 feet high. There is no fresh water to be found on the island.

A very small, low islet, called Minor, lies 1 mile **NE.** from Smith's Island, and at very low tides it is connected with it by a narrow ridge of bowlders and rocks. A field of kelp extends to the westward of Smith's Island for  $1\frac{1}{2}$  miles, and has a width of 1 mile. In sailing through this field we found the depth of water uniform at  $6\frac{1}{2}$  fathoms, and in no place did we get less; but in 1870 the *Fauntleroy* found a *sunken rock* bare at the lowest tides. It is  $\frac{3}{4}$  mile **SW.** by **W.**  $\frac{3}{4}$  **W.** from the light-house, and in a fog a large lumberman was seen going between it and the island. The bottom is hard and sandy. Another, smaller, field is seen to the westward of the one just mentioned. Good anchorage is found on the northern side of the island, to the eastward of the kelp, in from 10 to 5 fathoms; and on the southern side of the island, to the eastward of the kelp, in from 10 to 8 fathoms of water, hard bottom. We parted our cable here in a **SE.** gale, but the smooth, sandy bottom enabled us afterwards to secure the anchor. Off the eastern end of the small islet very deep water is found close to the shore.

#### THE LIGHT-HOUSE ON SMITH'S ISLAND.

This structure consists of a keeper's dwelling, with a short, round tower rising through the western half of the roof, and surmounted by an iron lantern painted black. Its height is  $41\frac{1}{2}$  feet above the surface of the ground. The dwelling and tower are of brick, and are plastered and white-washed, and situated on the highest part of the island near the southwestern point. All the trees have been cut down to afford a clear horizon in every direction. The illuminating apparatus is of the fourth order, and shows a *white flash every half minute*. The brightest part of the flash lasts 5 seconds. When a vessel is close to it the light is not lost, but varies from extreme brilliancy to a faint light.

The focal plane of the lens is 91 feet above the mean level of the sea, and under favorable conditions of the atmosphere the light should be seen 15 miles from a height of 15 feet.

The geographical position of the light, as determined by the U. S. Coast and Geodetic Survey is—

Latitude.....	48° 19' 06".8 N.
Longitude.....	122° 50' 35".7 W.

In January, 1886, the magnetic variation was 22° 42' east, and was at its maximum range.

The light shows into the entrances of Canal de Haro, Rosario Strait, and Admiralty Inlet, and out into the Strait of Juan de Fuca.

#### BANKS AND FIELDS OF KELP IN THE STRAIT OF FUCA.

##### THE HASSLER BANK.

About  $8\frac{1}{2}$  miles **NW.** by **W.**  $\frac{1}{4}$  **W.** from New Dungeness light-house, on the line and nearly midway to Victoria, where the former charts gave depths from 36 to 44 fathoms, there has been developed a twenty-fathom bank 2 miles long **N.** and **S.** and  $\frac{1}{2}$  mile wide, with as little as 15 fathoms of water over it.

##### PARTRIDGE BANK.

About 3 miles **S.**  $\frac{3}{4}$  **W.** from Smith's Island light-house is the northwestern point of this bank, within the limits of 10 fathoms of water. Inside that depth the bank is 3 miles long **W.** by **N.** and **E.** by **S.**,  $1\frac{1}{2}$  miles in width, and the eastern extremity reaches within  $1\frac{1}{2}$  miles of Partridge Point. It is nearly on the prolongation of the shore-line from Admiralty Head to the point. The northern and eastern sides fall off sharply to 20 and 30 fathoms. The bottom is generally sand, gravel, and bowlders, except near the shoalest spot, where it is rocky and thickly covered with kelp. This dangerous rock lies on the northern side of the bank midway between the eastern and western ends. It has a depth of only 14 feet at the lowest water, and is distant  $3\frac{1}{4}$  miles from the nearest shore of Whidbey Island. A considerable part of the bank is covered with kelp, which is much under-run by strong currents. The kelp generally extends to the seven-fathom curve, except toward the eastern end, where the shoal narrows, and no kelp exists beyond a depth of 4 fathoms. The currents over the bank are irregular, except under the eastern extremity, where they set strongly from the **N.** and **NW.** at flood and ebb tides.

There are current-rips on all the banks in the Strait of Fuca, which split the moving volumes of water; and these rips are heavier in westerly winds.

It is reported that a rock has been seen at the lowest spring tides on this bank; but the original survey was made at the lowest spring tides and no danger seen, and this report has not been verified.

## PARTRIDGE BANK.

**Buoy on the Partridge Bank.**—To mark the dangerous rocky spot on this bank a *first class can buoy, painted black and numbered 1*, has been placed in 24 feet of water at the southeastern point of the thickest patch of kelp and distant 66 yards **S SE.  $\frac{1}{4}$  E.** from the fourteen-foot rock and on the line through Smith's Island light-house and the rock. The following bearings and distances are given to locate the buoy:

Smith's Island light-house.....	N NW. $\frac{1}{4}$ W., 3.7 miles.
Point Wilson light-house.....	SE. $\frac{1}{4}$ E., 7.5 miles.
New Dungeness light-house.....	SW. $\frac{1}{4}$ S., 11.7 miles.

Vessels bound from the western part of the strait into Admiralty Inlet must leave this buoy on the port hand. Vessels passing this black buoy will find the next buoy off Partridge Point a red one, which they must leave on the port hand if bound into Admiralty Inlet.

## THE HEIN BANK, STRAIT OF FUCA.

Bearing **W.  $\frac{1}{2}$  S.** from Smith's Island light-house, and 8 miles distant, is another field of kelp nearly 1 mile in extent.

Recent partial examinations show that this field marks the northern part of the bank lying nearly **N.** and **S.** with a length of  $4\frac{1}{2}$  miles and a breadth of  $1\frac{1}{2}$  miles within the limits of the twenty-fathom line, and that the least water found among the kelp near the eastern edge of the field is  $3\frac{1}{2}$  fathoms, where Smith's Island light-house bears **E.  $\frac{3}{4}$  N.**, distant 8 miles, and New Dungeness light-house about **S.** by **E.  $\frac{1}{4}$  E.**, distant  $10\frac{1}{2}$  miles. This bank should be avoided. There may be dangerous pointed rocks in the thick kelp.

In the English Admiralty Chart No. 1917, published in 1865, it is called the Fonte Bank.

The field laid down as doubtful on the Admiralty Chart of 1847, nearly **W.  $\frac{3}{4}$  N.**, 4 miles from Smith's Island, and having only 2 fathoms marked upon it, has been sought for by the U. S. Coast Survey but not found; it is not laid down on the British Admiralty Chart No. 1911, with corrections to 1865, nor referred to in the Vancouver Island Pilot.

## TWELVE-FATHOM BANK, STRAIT OF FUCA.

About 5 miles **SW.  $\frac{1}{2}$  W.** from Smith's Island light-house lies the northern part of a bank, upon which  $11\frac{1}{2}$  fathoms of water has been found, over a bottom of fine gray sand and broken shells. There is no kelp. The extent of the bank within the twenty-fathom curve is 3 miles long, lying **N NW.** and **SSE.**, and  $1\frac{1}{2}$  miles broad.

## VICTORIA, B. C., AND PUGET SOUND TO DIXON ENTRANCE.\*

From Victoria, or Puget Sound, it is usual for vessels to pass through Haro Strait and enter the Gulf of Georgia by the East Point of Saturna Island, or through Active Pass.

From Victoria, passing about  $\frac{1}{2}$  mile to southward of Trial Island, and rounding Discovery Island, at a distance of about 1 mile, steer a **N.  $\frac{1}{4}$  W.** course for  $3\frac{1}{2}$  miles from the light-house bearing **NW.** This course heads for the well-marked *Lime Kiln* on San Juan Island.

From Port Townsend, round Port Wilson at  $\frac{1}{2}$  mile distance; when that point bears **SW.** a course **W NW.** leads to the middle of the southern entrance to Haro Strait. This course passes clear to the eastward of the Hein Bank, which lies 8 miles **W.** by **S.** from Smith's Island, and has  $4\frac{1}{2}$  fathoms least water and is marked by kelp. It also leads across the Middle Bank, which has 11 fathoms least water.

From a point in mid-channel, on the range between the Lime Kiln and Discovery Island light-house, a course **NW.  $\frac{1}{4}$  N.** for 14 miles carries clear through Haro Strait to a point midway between Moresby and Stuart Islands. This course passes about 1 mile to the eastward of the kelp reef. This reef uncovers at low springs and is well marked by kelp. A black nun buoy is now moored to the eastward of the reef. From the point between Moresby and Stuart islands, the most direct course to the Gulf of Georgia is by way of Swanson Channel and Active Pass.

The longer and less tortuous channel around East Point of Saturna Island is also used. By this latter route, after passing Stuart Island, when Sucia and Matia islands open to the northward of Waldron Island, steer a **NE.** course, heading for Patos Island.

East Point of Saturna Island is now marked by a *revolving white light*, flashing every 30 seconds, and visible 18 miles.

The tides are very strong around East Point, and the irregularities of the bottom cause many swirls and overfalls. Reefs extend about 1 mile to the northward of the point, and a course up the gulf should not be laid until Patos Island bears **E.** by **S.  $\frac{1}{4}$  S.**, when a **W.** by **N.  $\frac{1}{4}$  N.** course for 31 miles should take a vessel abreast the Gabriola Reef, with the beacon bearing **SW.**, distant  $2\frac{1}{2}$  miles. A black buoy marks the submerged portion of the reef  $\frac{3}{4}$  mile to the northward of the beacon.

\* For more extended information regarding the inland waters of British Columbia, the navigator should consult the Vancouver Island Pilot and Supplement from the Admiralty Surveys, and also B. A. charts.

To enter the Gulf of Georgia by Active Pass continue the NW.  $\frac{1}{4}$  N. course, through Haro Strait, until in mid channel between Moresby Island and Wallace Point of Pender Island; thence following a mid channel course through Swanson Channel, passing to the eastward of Prevost Island.

From Portlock Point, the southeastern point of Prevost Island, the entrance to Active Pass bears N. by W.  $\frac{1}{2}$  W.,  $1\frac{1}{2}$  miles. Helen Point, the southern point of entrance, is low, bare, and of a yellowish color; over its northern side rise the high, stony hills of the eastern end of Galiano Island; the entrance itself does not become very apparent until it is approached within 1 mile.

Otter Bay, on the west side of Pender Island, affords an anchorage, if necessary; a very fair anchorage is to be had in the center of the bay in 8 fathoms, and no dangers.

There are few dangers to be avoided in passing from Swanson Channel through Active Pass; the principal of them is the Enterprise Reef, two dangerous patches that lie off the western side of Mayne Island; they are two rocky patches, the westernmost of which dries at low water; both are marked by kelp. In 1887 a day beacon was erected on the westernmost Enterprise Reef.

When Helen Point bears N. by E. the reef is cleared and the entrance to the pass may be steered for. Red and Bright islets, on the northern side of Prevost Island, should be given a berth of not less than 1 cable.

Active Pass runs in an ENE. direction for  $1\frac{1}{2}$  miles, and then turns N. for the same distance. The average breadth of the channel is about  $\frac{1}{2}$  mile, and its general depth about 20 fathoms.

The great strength of the tides, together with the absence of steady winds, renders it unfit for sailing vessels; for steamers it is an excellent channel, and a vessel commanding a speed of 8 knots may take it at any time without fear. A small rock, on which there is said to be a depth of only a few feet, is reported, by the local pilots, to exist off Laura Point, but out of the track of vessels. Except this there are no hidden dangers.

About  $\frac{1}{4}$  mile inside the southern entrance, and very close to the northern shore, is a rock which uncovers at half tide; it cannot be said to be in the track of vessels; in passing to the northward, however, against the flood, a vessel should keep rather on the southern side, as the tide sets over toward this rock. Miners Bay, at the bend of the pass, affords an anchorage if necessary, but a vessel must go close in to get 12 fathoms, and then she is barely out of the whirl of the tide.

In passing out or entering the northern entrance, the best directions are to pass through in mid channel; no favorable eddy, or less strength of the tide, will be found on either side.

Since 1885 a fixed white light, visible 12 miles between the bearings N.  $73^{\circ}$  W., through north, to N.  $62^{\circ}$  E., has been shown from a light-house erected on Georgiana Point of Mayne Island, indicating the last point of entrance to Active Pass from the Gulf of Georgia. In 1887 a fog-bell, sounding one stroke every 15 seconds, was added to the light-house.

Tides.—The flood tide sets from W. to E., or from Swanson Channel into the Gulf of Georgia, and the ebb in a contrary direction. The velocity during spring is sometimes 7 knots; at ordinary tides from 3 to 5 knots. In the northern entrance there is sometimes a heavy tide rip, caused by a patch of 7 and 9 fathoms and the meeting of the tides through the pass with that in the gulf.

It sometimes happens that with calm and clear weather in Haro Strait and Swanson Channel a strong northwester will be found blowing down the Gulf of Georgia.

For the navigation of Trincomalle Channel, Portier Pass, etc., reference is made to the Vancouver Island Pilot. These passages are usually used only for local traffic.

Leaving the northern entrance of Active Pass, when well clear of all tide rips, and being about 1 mile N NW. from the light-house, a course NW. by W.  $\frac{1}{4}$  W. for 20 miles brings the beacon on Gabriola Reef bearing SW., distant about  $2\frac{1}{2}$  miles.

From this point the fixed white light on Entrance Island should be seen, bearing W.  $\frac{1}{2}$  S., and a course W.  $\frac{1}{4}$  N. will carry clear  $\frac{1}{2}$  mile to the northward of the island. When Entrance Island bears S., steer W SW.  $\frac{1}{4}$  W. for  $3\frac{1}{2}$  miles, passing  $\frac{1}{2}$  mile to the northward of Light-House Island, when a course SW.  $\frac{1}{2}$  S. may be steered for the entrance to Departure Bay; or S. by E. if bound to Nanaimo.

Steamers to Alaska usually coal at Departure Bay or Nanaimo. No pilot is necessary for Departure Bay; a Nanaimo pilot is generally cruising off Entrance Island.

Gabriola Reef.—From Active Pass to Departure Bay the only danger is Gabriola Reef, marked by a beacon, and a buoy at its northern end; the reef partially uncovers at low water. The rocks in Nanaimo Harbor are marked by beacons or buoys, as is also the inside passage leading to Departure Bay from Nanaimo. There is a shoal lying  $\frac{1}{2}$  mile SE. from Light-House Island, marked by a red buoy at its southeast end.

Vessels making the passage to Alaska usually leave Departure Bay at such an hour as will bring them to Seymour Narrows at the proper hour for going through. The distance is 80 miles.

It is usual to pass to the southward of the Ballinac Islands, and also The Sisters. The latter are low (10 feet high), and dark colored, and not easily distinguished on a dark night. The Sisters are bold-to but should not be approached too close, as the tide sets straight past them. In this vicinity the shores of Vancouver Island are low and heavily wooded, with high and rugged mountains in the interior. The main land to the northward is high and rugged.

From The Sisters a course NW. by W.  $\frac{1}{4}$  W. heads for the entrance to Discovery Passage, taking precautions not to be set to the northward by the flood tide. The tides meet just south of Cape



## DISCOVERY PASSAGE.

Mudge, where it is high water, F. and C., at 5<sup>h</sup> 30<sup>m</sup>. The ebb tide runs to the southward from that point, and there are strong tide rips in that vicinity.

## DISCOVERY PASSAGE

is the only navigable channel from the Gulf of Georgia to the NW. From Bute Inlet through Cardeno Channel is another passage, but it is practically closed by the rapids of Arran Pass, between Stuart and Valdes islands.

Discovery Passage is about 23½ miles in length, averaging about 1 mile in width, except at Seymour Narrows, where it is contracted to less than ½ mile.

**Cape Mudge**, the southern point of Valdes Island, forms the eastern entrance point to Discovery Passage. This cape is a peculiar headland, about 250 feet high, flat, and wooded on its summit, forming an abrupt yellow clay cliff, more or less covered with vegetation; it falls to the westward as it enters Discovery Passage, forming a low boulder point; the high land of Valdes Island appears behind it form the southward and eastward. A boulder beach extends in a semi-circular form from it to the eastward, and at the distance of 2 miles in this direction the depth is not more than 5 fathoms. The edge of this shoal is fringed with kelp during the summer, and is generally well defined by a tidal line, which it is recommended not to stand into.

**Willow Point**, off Vancouver Island, the SW. entrance point to Discovery Passage, lies S. by W. nearly 2 miles from Cape Mudge; it is low and covered with willow bushes. A sandstone ledge extends NE. from Willow Point nearly 3 cables, and that point should not be approached in passing nearer than ½ mile.

## DIRECTIONS FOR DISCOVERY PASSAGE.

The western low part of Cape Mudge should not be brought to the westward of W NW. in entering or leaving Discovery Passage. The channel is free from dangers, and presents no difficulties to steamers. Sailing vessel are recommended to enter it only in clear weather, with a fair wind, and after the first rush of the flood is over.

On the W. shore, one mile NW. by W. from Cape Mudge, is a shoal patch with 8 fathoms; over this the current forms strong tide rips. On the E. shore, 2 miles N NW. from Cape Mudge, is an Indian village, off which 15 fathoms may be had, close in shore; immediately N. of this is a patch having 9 fathoms.

On Valdes Island, about 3 miles above Cape Mudge, is Quathiasky Cove, a small indentation bordered by a sandy beach; this cove is only fit for small craft. In the center is Grouse Island, small, and moderately high, with a shoal extending 400 feet SE. from its SE. point. The tide is slight in the cove, but the current runs strongly past the entrance necessitating care in entering. The anchorage is south of Grouse Island in about 10 fathoms, midway between the island and the opposite shore. A shoal patch exists in the middle of the northern entrance with 3 feet upon it.

On the W. shore of Discovery Passage, 5½ miles above Willow Point, is the mouth of the Campbell River, navigable for some distance by boats or canoes. In this vicinity an eddy current is said to run close in shore, running to the northwestward with the flood.

About 1½ miles NW. from Campbell River is Orange Point, bare, and round, and of a reddish color, and forming the eastern extreme of Duncan Bay, an indentation in the W. shore about ½ mile deep. It is easy of access, well out of the tides, with good anchorage in 7 to 14 fathoms, and sheltered from all except NW. winds. A good position to anchor is about 3 cables W. by S. from Orange Point in 7 to 14 fathoms.

From Orange Point a boulder spit extends 1½ cables NW. by N.; it is marked by kelp in summer. This is the best anchorage when waiting for the tides to go through Seymour Narrows.

In Duncan Bay, with the flood tide from the northwestward, a strong eddy current is running to the northwestward.

**Gowland Harbor**, on Valdes Island, lies NE. from Duncan Bay. Steep Island forms the southern head of the entrance to the harbor; this island is less than ½ mile long, very narrow, with a bluff shore on the western side, and is about 100 feet high. The harbor is more or less embarrassed by rocks, and is of no great value with Duncan and Menzies bays so near.

The shore of Valdes Island from Gowland Harbor, trending in a W NW. direction, is bold-to, high, and rugged for about 4 miles to Maud Island, the SE. point of Seymour Narrows. On the Vancouver Island side, from Duncan Bay, the bluffs are lower, and the shore trends about NW. for nearly 3 miles to Race Point, a bluff high promontory, flat, rocky, and bare of trees; it is steep-to and the tides run past it with great velocity during the flood, forming tide rips very dangerous for boats.

From Race Point the land trends W SW. to Menzies Bay, an indentation in the Vancouver shore, 1½ miles deep, NW. and SE., and ¾ mile wide. A stream comes in at the head of the bay with a broad bank at low water. The middle of the bay, just within the entrance, is obstructed by a large triangular shaped sand bank, partly dry at low water, and having a clear passage on each side about 1½ cables in width. Good, well sheltered anchorage in 5 or 6 fathoms may be found between this bank and the head of the bay. The E. shore of the bay is high and rugged; the western shore low, and from the head an extensive valley runs to the NW.

## TO ANCHOR IN MENZIES BAY.

If intending to anchor in this bay it is recommended to keep within a cable of the eastern shore for  $\frac{1}{2}$  mile, when steer to the westward, toward the center of the bay, and anchor in about 6 fathoms, muddy bottom,  $\frac{1}{2}$  mile from the head of the bay, and 2 cables from the E. shore. Vessels may enter south of the shoal by keeping within a cable of the western shore until Maud Island is shut in by Wilfred Point, when a N.  $\frac{1}{2}$  W. course leads to the anchorage. There are strong eddies off Wilfred Point during the strength of the tide. With the flood tide a strong eddy sweeps into Menzies Bay, but it is not felt at the anchorage.

## SEYMOUR NARROWS.

At Maud Island, Discovery Passage is contracted to less than  $\frac{1}{2}$  mile in width, and the navigation is further obstructed by Ripple Rock, nearly in mid-channel, and having  $2\frac{1}{4}$  fathoms on it at low water, and by another rock having 4 fathoms on it, lying 200 yards further N. Close around these rocks the water varies in depth from 12 to 40 fathoms.\*

Wilfred Point, the western point of entrance to the Narrows, is over 300 feet high, bluff and rocky.

Maud Island, which is the eastern point of entrance, is about 300 feet high, nearly round, less than  $\frac{1}{2}$  mile in diameter, with a boat passage between it and Valdes Island. A small islet called Yellow Island lies about 3 cables E. of Maud Island.

Tides at Seymour Narrows.—It is high water, F. and C., at Seymour Narrows at 5 hours.† Springs rise,  $14\frac{1}{2}$  feet.

Flood tide runs to the southward.

Owing to the contraction of the passage the tides rush through these narrows with great velocity, attaining fully 14 knots at spring tides, and in the full strength of the tide it becomes a boiling race, filled with whirlpools and overfalls, which at that time render the passage impassable.

The surface current runs, at spring tides, from  $1\frac{1}{2}$  to  $2\frac{1}{2}$  hours after high and low water by the banks, but with a constantly diminishing velocity.

When the tide is running strong the position of Ripple Rock is plainly marked by the whirl of waters over it.

## SAILING DIRECTIONS.

It is recommended to vessels bound either way to be at the narrows at high water, as the fair ebb current will then soon be met. Vessels cannot with safety attempt to "run the narrows" during the full strength of the tide. Sailing vessels must go through with the tide, and all control over them by the helm is lost until they have passed the whirl of the tide; and even with steamers steerage way is difficult.

In passing through keep the eastern shore aboard about 1 cable distant. The shores of Maud Island are bold-to, and the tendency of the current is to keep vessels off its shores.‡

A vessel is well past Ripple Rock when the passage north of Maud Island is open.

From the Narrows take a wide channel course to Chatham Point.

Passing the Narrows going north, the channel expands to about  $1\frac{1}{2}$  miles in width, forming on the Vancouver Island side a small bight with a gravel beach, marked on its northern side by a prominent white boulder, and on the opposite shore Plumper Bay, which is easy of access, and well sheltered; anchorage may be found in its southeastern part, in from 9 to 14 fathoms, about 2 cables off shore. This anchorage is only desirable if obliged to anchor to wait a favorable tide in the Narrows. The eddies and tides in the bay are very strong. The safest plan is to "lie-to" and wait for the tide. Deep Water Bay is too deep for an anchorage.

From here the shores of Discovery Passage become steep and rugged, the channel trending NW.

About 5 miles N. of Deep Water Bay is an unnamed bay, with a number of islets in it, but no anchorage noted. A mile farther N. is another smaller and narrower bay; these bays have not yet been surveyed, but they are said to extend much farther than is indicated on the British Admiralty charts. Between these bays is Granite Point, rather low, wooded on top, bare at the end, highest toward the northern inlet or bay, and off which, at 2 cables distance NW., is a sunken rock having only 9 feet of water on it.

\* The U. S. S. *Saranac* was wrecked on Ripple Rock in June, 1878.

† From U. S. C. S. Tide Tables for The Pacific Coast for 1890.

‡ Ripple Rock, Seymour Narrows. " " " " In February, 1882, the U. S. S. *Wachusett* started from Duncan Bay, four miles from the southern entrance to Seymour Narrows, allowing  $1\frac{1}{2}$  hours for the overrun of the tide, as marked on the chart. This allowance is not always reliable, as the tide was running strong ebb when the *Wachusett* reached the Narrows.

After having passed the Ripple Rock, as the pilot declared it to exist, the ship settled down in an enormous whirlpool and struck heavily, carrying away a considerable portion of her false keel and badly splintering her keel. It is likely that instead of Ripple Rock being an isolated pinnacle rock, as has always been supposed, it is a reef, extending in a NE. by N. and SW. by S. direction 300 or 400 hundred yards.

Directions.—In order to clear the reef at all times a vessel should keep the eastern shore aboard.

U. S. H. N. No. 11, 1883.

## JOHNSTONE STRAIT.

The western shore, NW. of the Narrows, is nearly straight, and at about nine miles above Separation Head forms a rather low, sloping point, known as Otter Point, having a gravel beach, with a fringe of kelp off it. Westward from this point is a small indentation called Elk Bay, affording an indifferent anchorage in 14 fathoms, about  $\frac{1}{2}$  mile from its head.

About  $\frac{3}{4}$  mile NW. from the northern headland of Elk Bay, in a slight indentation of the shore, lies a rock covered at  $\frac{1}{2}$  tide,  $1\frac{1}{2}$  cables off the beach.

About  $3\frac{1}{2}$  miles NW. from Otter Point lies Otter Cove, about 4 cables in extent, on the western side of the passage, and just south of Chatham Point. It is a snug anchorage, and sheltered from all winds by Limestone Island, which is a small islet about 100 feet high; about a cable ENE. from this islet lies Snag Rock with 2 feet of water on it.

Vessels intending to anchor in Otter Cove should enter in mid channel on the northern side of Limestone Island, and anchor midway between it and the head of the cove in from 6 to 10 fathoms. There is a narrow 4 fathom passage, bordered by shoals, on the southern side of the island. Large vessels must moor.

Directly north of this cove is Chatham Point, forming the NW. headland of Discovery Passage. It is a low, rocky point, fringed with rocks which extend to the eastward and northward  $\frac{1}{4}$  mile. About 2 cables NE. from its northern extreme is Beaver Rock, awash at low water, and from which scattered, sunken rocks are said to extend three cables farther NE. In rounding the point the shore ought not to be approached nearer than  $\frac{3}{4}$  mile. Between the point and Nodales Channel are several strong eddies or tide ripples, which may indicate sunken rocks.

The Northern entrance to Discovery Passage is here  $1\frac{1}{4}$  miles wide. An islet lies west of, and close to, its eastern headland; the point on Valdes Island, opposite Chatham Point, has a nearly bare, steep, rocky face not much higher than Chatham Point.

The tides in this vicinity run from two to five knots.

Nodales Channel and Johnstone Strait intersect Discovery Passage at right angles at Chatham Point. Four miles to the eastward in Nodales Channel is an indentation in the Valdes Island shore, forming an anchorage known as Cameleon Harbor.

## JOHNSTONE STRAIT

which separates the northern side of Vancouver Island from the Thurlow and other islands and the mainland, is comprised between Chatham Point and Ella Point, on Vancouver Island, being about 55 miles in length, and having a width of from 1 to 2 miles. The shores on both sides are high and rugged, especially on Vancouver Island, where an almost continuous range of mountains rises abruptly from the sea to from 2,000 to 5,000 feet in height, some of which bear snow throughout the year. The shores of the strait are bold-to, except as hereafter noted, and there are no anchorages on the southern shore.

**Tides.**—The tides vary in places from 3 to 5 knots. It is high water F. and C. everywhere in Johnstone Strait at 0<sup>h</sup> 30<sup>m</sup>; rise and fall about 16 feet. The stream runs by the shore from 2 to 2 $\frac{1}{2}$  hours after high and low water; and, except near Helmcken Island and to the eastward of Knox Bay, seldom exceeds 1 to 3 knots per hour.

Magnetic variation is 24° 30' E. (1887), with a probable increase of 2 minutes annually.

From Chatham Point to the W. end of Thurlow Island the water in mid channel is very deep; thence to Hardwicke Island the bottom is irregular, and beyond that again deepens. There are heavy tide rips near Helmcken Island which, in blowing weather, would be dangerous to boats and small craft; and just W. of Chatham Point is sometimes an overflow, which at times produces a considerable swell.

About  $3\frac{1}{2}$  miles W. from Chatham Point are the Pender Islands, rugged and barren, the largest being 150 feet high; they lie close to the Thurlow Island shore and the channel is S. of them; foul ground exists to the E. and W. of them for nearly  $\frac{1}{2}$  mile, and their S. side should not be approached nearer than 2 cables. The tide sets strongly through among these islands.

About 6 miles to the westward of Chatham Point, on the Vancouver shore, is Ripple Point, off which are heavy tide rips in blowing weather; the point is bold-to, and directly abreast of it is an unexplored opening in the Thurlow Island shore.

Knox Bay, on the northern side of the strait, 7 miles from Chatham Point, is  $\frac{3}{4}$  mile deep in a northwesterly direction, and about the same in width. It affords a poor anchorage in 15 to 17 fathoms, 2 cables from its head, on the edge of a bank which is steep-to. From the steepness of this bank a vessel at anchor there would probably touch if a southerly breeze sprang up.

Beyond Knox Bay the Thurlow Island shore is almost straight, extending in a W SW. direction nearly 6 miles, when it turns to the NW.; its shores are high and rugged, and may be approached to a cable distance.

Eden Point, the NW. extreme of Thurlow Island, is bold and cliffy, and forms the southern headland of the entrance to Chancellor Channel. Half a mile SE. of Eden Point is a small bay, too deep to afford an anchorage except for small craft at its head. On the line from Eden Point to Camp Point Peak, on Vancouver Island and close to the Vancouver shore, lies a rock, covered at high water and not shown on the British Admiralty chart.

Westward from Eden Point, Johnstone Strait becomes wider and so continues; at this point its width is nearly 2 miles. On the Vancouver shore,  $9\frac{1}{2}$  miles from Ripple Point, is Camp Point, sloping gradually to the water, with a rocky beach off it;  $\frac{1}{2}$  mile to the NE. of Camp Point is Ripple Shoal, about  $\frac{1}{2}$  mile in length E. and W., marked by kelp and having 6 to 9 fathoms on it, with deep water all around.

The N. side of the strait in this vicinity is formed by Hardwicke Island, which is separated from the Thurlow Islands by Chancellor Passage.

West southwest from Eden Point,  $2\frac{1}{2}$  miles, lies Helmcken Island, in the middle of the strait,  $1\frac{1}{2}$  miles long and about  $\frac{1}{2}$  mile wide, with a rugged and irregular shore-line. It is nearly 200 feet high, and has several small islets close to on its NE. shore. On each side of the island is a clear passage nearly  $\frac{1}{2}$  mile wide. In the northern passage lies Speaker Rock, which covers at less than one-half tide, and is situated  $2\frac{1}{2}$  cables NE. from the eastern point of the island.

The northern passage is known as Current Passage, and has deep water with about the same tide as Race Passage, on the S. side, which is the one generally used.

The tides run strongly through Race Passage, not less than 7 knots at spring tides, and there are some heavy tide rips in the eastern part. The flood tide runs to the eastward.

Westward from Camp Point,  $4\frac{1}{2}$  miles on the Vancouver shore, is a slight indentation known as Salmon Bay, with extensive flats at its head, giving it the appearance of considerable extent at high water, but there is no anchorage; a large shallow river, navigable only for canoes, empties into the bay from an extensive valley which stretches away to the SE., and in the center of which appears Valley Cone, a remarkable bare peak about 800 feet high. This valley forms the only break in the mountain range of the Vancouver shore.

The S. shore of Hardwicke Island is steep to, except near its SW. extremity, where Earl Ledge runs off for 3 cables, uncovering only at low water.

Off the western end of Hardwicke Island lies York Island, high, round, and  $\frac{1}{2}$  mile in diameter, and another low islet  $\frac{1}{2}$  mile further W.;  $\frac{1}{4}$  mile off the outer islet lies Fanny Reef, awash at high water, and marked by kelp.

The entrance to Sunderland Channel, between Fanny Reef and the N. shore, is subject to heavy tide rips.

Less than 2 miles NW. from York Island is Tuna Point, the SE. headland of Blinkinsopp Bay, over 1 mile deep and  $\frac{1}{2}$  mile wide, with extreme tidal flats at its head. The shores are high, and the bay affords a good anchorage in 8 to 12 fathoms, about  $\frac{1}{3}$  mile NE. of its SW. point, in range with that point and Jesse Island.

**Directions.**—The only direction required is to enter in mid channel and anchor on obtaining 12 fathoms, as the bank is rather steep. About  $\frac{1}{2}$  mile SW. from the bay is Jesse Island, small and steep to, lying about 2 cables off shore.

About 2 miles W. of Jesse Island is the entrance to Port Neville, an inlet some 7 miles in length, in a generally NE. direction, and from  $\frac{1}{4}$  mile to 1 mile in width. It affords spacious and secure anchorage when once inside. The entrance about  $\frac{1}{2}$  mile inside is obstructed by Channel Rock, of small extent and dangerous, having but 4 feet of water on it, with 12 feet in the channel to the eastward of it, and 17 feet to the westward at low water, so that unless vessels specially require to enter this port, the anchorages of Port Harvey and Blinkinsopp Bay, which are at no great distance, ought to be preferred, both being secure and easy of access.

If necessary, a vessel may anchor in the entrance to Port Neville, about  $\frac{1}{2}$  mile N. of Milly Island, in  $4\frac{1}{2}$  or 5 fathoms at low water.

At Port Neville the tide rises 17 feet at spring.

W. by S.  $\frac{1}{4}$  S. from Port Neville, 4 miles distant and  $\frac{1}{4}$  mile off shore, is Slimpson Reef, which covers at half tide and shows kelp in summer.

W SW.  $\frac{3}{4}$  W. from Slimpson Reef, on the Vancouver shore, is Adams River, a small stream with extensive flats, filling a small indentation in the coast, behind which rise high mountains, one peak attaining the height of 5,000 feet.

Nearly abreast of Adams River, on the northern shore, are the Broken Islands, lying off a point of the mainland, with a boat passage between them and the shore, at the entrance to Port Harvey and Havannah Channel. They are small, rugged, and low, and may be approached to  $\frac{1}{4}$  mile on the S. and SW., but to the northward rocks, ledges, and kelp, indicating shoals, extend out  $\frac{3}{4}$  mile.

About  $1\frac{1}{2}$  miles to the northward of these islands is the entrance to Havannah Channel, which, running northeasterly 4 miles, connects with Call Creek Inlet.

From the Broken Islands N. by W.  $1\frac{1}{2}$  miles lies the entrance to Port Harvey, which is here about  $\frac{1}{2}$  mile wide and extends for 2 miles to the northward. There are several islets, known as the Mist Islands, within it, and the shores are rugged; from its head swampy ground extends to the NE., and to the NW. is a narrow gorge which partly fills at high water and joins Knights Inlet. The soundings in the entrance vary from 60 to 80 fathoms, shoaling rapidly toward the head.

It is high water, F. and C., at Port Harvey at 1<sup>h</sup> 00<sup>m</sup>; tides range about 10 feet.

**Directions.**—To anchor in Port Harvey, keep in mid channel till past the Mist Islands, when the anchorage opens out and a berth may be selected in 7 to 9 fathoms, muddy bottom, about  $\frac{1}{2}$  mile from the head of the bay.

About 2 miles **W SW.** from Broken Islands lies Escape Reef,  $\frac{1}{2}$  mile off the **N.** shore of Johnstone Strait, with deep water between it and the shore; it is about a cable in extent with 4 feet least water on it, and marked by kelp in summer.

This reef, which has deep water around it, is in the track of vessels bound into Port Harvey from the westward, and into Forward Bay from the eastward. To avoid it in the first instance keep in mid channel until the entrance of the port is well open bearing **N NE.** or **N.** by **E.**, when steer for it; in the second case keep mid channel until Forward Bay bears **NW.**, when steer for it.

About 4 miles **W SW.** from the Broken Islands is Forward Bay,  $1\frac{1}{4}$  miles broad and  $\frac{3}{4}$  mile deep, with Bush Islet, 30 feet high, off its **SW.** point; its shores are moderately high, and a bank extends out nearly 3 cables from its head. This bay affords good anchorage in 14 to 10 fathoms off the edge of the bank, and about  $\frac{3}{4}$  of a mile **NE.** of its **SW.** point, well sheltered from all except southeasterly winds, and even these send in no sea; it is easy of access for any class of vessel, and is a very good stopping place.

**Directions.**—To anchor in Forward Bay, keep in mid channel until Green Islet, on the eastern side of the bay, bears **NW.**, when the course is **W NW.** for the middle of the bay; anchor in 14 to 10 fathoms  $\frac{1}{2}$  mile off shore. From the westward vessels should not approach the northern shore within  $\frac{1}{2}$  mile until the head of the bay opens out past Bush Islet, when a course may be laid for the anchorage.

From Forward Bay the northern shores of Johnstone Strait becomes comparatively low, trending **W.** by **S.** for 15 miles to Weynton Passage, the termination of the strait.

**Boat Harbor**, a small cove affording shelter for boats, is 6 miles **W SW.** from Forward Bay, the shores between them being bold-to for the most part, and may be approached to  $\frac{1}{4}$  mile;  $2\frac{1}{2}$  miles **S.** from Boat Harbor, on the southern shore, is Robson Bight, of no particular importance.

Beyond Boat Harbor, about 3 miles to the westward, are the Sophia Islands, of small extent,  $\frac{1}{4}$  mile from the shore; and 2 miles farther **W.** is Point Cracroft, the extreme western point of Cracroft Island. Between Boat Harbor and Point Cracroft the shores are rocky, and should not be closely approached.

**Cracroft Island** is separated from Hanson Island by Blackney Passage, a strait about 1 mile wide. Hanson Island, about 100 feet high, with rocky shores, extends about 3 miles to the westward. Off the western end of Hanson Island are a large number of islets and rocks extending nearly  $1\frac{1}{2}$  miles to the westward. Abreast of this point are tide rips, and on the Vancouver shore is a small, low islet called Blinkhorn Island, on which the timber has been prostrated by a violent wind squall.

On the southern shore,  $1\frac{1}{4}$  mile **W.** of Blinkhorn Island, is Ella Point, the southwestern headland of Johnstone Strait, with some rocks extending  $\frac{1}{4}$  mile northward from it. There is an indentation to the eastward of Ella Point known as Banza Cove, but with too deep water to afford an anchorage.

At its western termination Johnstone Strait is  $1\frac{1}{2}$  miles wide and clear of obstructions. In this vicinity the tide runs from 3 to 5 knots, flood to the eastward.

#### NAVIGATION OF JOHNSTONE STRAIT.

For a steamer, or a sailing vessel with a fair wind, the navigation of Johnstone Strait presents no difficulties, it being only requisite to keep in mid channel, except when nearing Helmcken Island from the eastward, when a vessel ought, after passing Thurlow Island, to keep within 3 cables length of the southern shore, or Camp Point, until past the Ripple Shoal, which, being marked by kelp, is very likely to have less than 7 fathoms on it.

The tides are strong near Helmcken Island, but not so much so as to interfere with the progress of a vessel of moderate steam power. To the westward they have no great strength.

In beating through the straits from the eastward, the shores to the eastward of Helmcken Island may be approached to 1 cable length, except for  $\frac{1}{2}$  mile on either side of the Pender Islands, the southern shore of which should not be approached within 2 cables, as the tides run strong in their vicinity. Between Thurlow Island and the western end of Hardwicke Island it is not advisable to beat, as there are several dangers, previously specified, and the tides run strong and irregular. From Hardwicke Island to the western end of the strait the southern shore may be approached to 1 cable, and the northern, except near the Slimpson and Escape Reefs, to 2 or 3 cables.

**Broughton Strait** connects Johnstone Strait with Queen Charlotte Sound. It is about 15 miles in length, with a width varying from 4 miles near the eastern entrance, to about 1 mile at its western entrance. Its southern shore is formed by Vancouver Island, and its northern shore by Malcolm Island; both, except near Beaver Cove, being moderately low. The eastern part is somewhat obstructed by islands, rocks, and shoals; but a clear, navigable channel exists,  $\frac{1}{2}$  mile wide in its narrowest part, along the Vancouver Island or southern shore. At the eastern entrance of the strait the depths vary from 60 to 100 fathoms, decreasing rapidly to the westward; abreast the Nimpkish River 15 to 20 fathoms may be had; the bottom westward from this becomes regular, with soundings from 15 to 40 fathoms.

**Anchorage.**—There are several anchorages along either side, available as stopping places. Alert Bay, on the south side of Cormorant Island, Port McNeil, on the Vancouver shore, and Mitchell and Rough Bays, on the south side of Malcolm Island, afford anchorages of more or less value.

**Tides.**—In Broughton Strait it is high water, F. and C., at 0<sup>h</sup> 30<sup>m</sup>, the tide ranging from 14 to 15 feet. In the navigable channel the stream runs from 1 to 4 knots, flood to the eastward; in the Race and Weynton Passages it runs from 3 to 6 knots, turning everywhere about 2 hours after high and low water by the shore.

**Beaver Cove**, at the entrance of Broughton Strait, is a two headed indentation of the coast, extending inland to the southward and westward about 1 mile, and  $\frac{1}{2}$  mile wide. Its shores are high and bold-to, except on the southern and western extremes. The water is too deep for convenient anchorage, except within 2 cables length of the western head, where anchorage may be found in from 10 to 15 fathoms. In hard gales the squalls come down from the high land with great force.

About 3 miles to the **SW.** of the cove is Mount Holdsworth, a remarkable conical peak, which rises to a height of 3,000 feet.

For nearly 7 miles to the westward of Hanson Island the navigable part of the strait is sheltered to the northward by the Pearse Islands and by Cormorant Island.

**Pearse Islands**, in the center of the eastern entrance of the strait, are a group of small, low islands, with some rocks extending a short distance to the **N.** and **SE.** of them. Weynton Passage, between Hanson and Pearse Islands, is about  $1\frac{1}{4}$  miles wide, with depths, in mid channel, varying from 40 to 60 fathoms. The shores on both sides are very much broken into rocks and small islets; the tide rushes through from 5 to 6 knots, and, except for special purposes this channel is not used.

**Race Passage**, between Pearse and Cormorant Islands, is  $\frac{3}{4}$  mile wide, but a rock lies in mid channel at its southern part; the tide runs through from 3 to 6 knots, and the passage is dangerous. Abreast of Beaver Cove, in mid channel, are tide rips.

**Cormorant Island** is  $2\frac{1}{2}$  miles long **E.** and **W.**, and  $\frac{1}{2}$  mile wide; it rises to a height of 350 feet; it is bordered by a sand beach. Abreast Cormorant Island, on the Vancouver shore, is the mouth of the Nimpkish River, which flows into a shallow bay, off which are tidal flats extending nearly a mile. A narrow, winding channel, carrying about 5 feet of water, extends into the shallow bay, and is navigable for canoes. Some 6 miles up the river, which passes through a broad valley bordered by mountains 1,500 to 3,000 feet in height, is Lake Karmutsen, a large sheet of water, into which several large streams fall, and to the **S.** of which the mountains rise over 5,000 feet. On the northern bank of the Nimpkish River entrance is a native village. About 1 mile **NE.**  $\frac{1}{2}$  **N.** from the river entrance is Green Islet, about 4 feet above high water, small, bare of timber, and covered with grass in summer;  $\frac{1}{2}$  mile **W.** of it is a rock, which uncovers at low water.

In navigating the strait, Green Islet should not be approached within  $\frac{1}{2}$  mile.

In this part of Broughton Strait a current of 1 to 3 knots runs for 2 hours after high and low water by the shore. Flood tide to the eastward.

**Alert Bay** is on the southern shore of Cormorant Island, abreast of Green Islet. Yellow Bluff, forming the western headland of the bay, may be recognized by a noticeable bare, yellowish colored cliff at the extreme of the point. The bay is  $\frac{1}{2}$  mile deep **N.** and **S.**, and nearly 1 mile wide; it is easy of access and affords a good and well sheltered anchorage in 5 to 9 fathoms, muddy bottom, the shores being everywhere free from danger. In the summer scattering kelp grows in deep water all over the bay.

No directions are necessary for entering. [See British Admiralty chart No. 2067]. Wood and water are abundant here. There is a large salmon cannery here, and a wharf at which moderate sized vessels can lie at all tides. A mission station is established here, and there is also a large Indian village. The house, marked on British Admiralty chart No. 2067, is a small one-story building with three windows toward the water; near it is a small chapel.

The northwestern angle of Cormorant Island is known as Leonard Point, from which **W.** by **S.**  $1\frac{1}{4}$  miles is a kelp patch in 4 fathoms. Two and a half miles nearly **W SW.** from Cormorant Island is Haddington Island, small and steep-to, except on its northern side, from which a bar extends to the northward across the strait to Malcolm Island, with as little as 6 feet on it in some places. Between Haddington Island and the ledge running eastward from Port McNeil is a clear passage  $\frac{3}{4}$  mile wide, carrying 7 fathoms in mid channel.

About 2 miles **W SW.** from the western point of Haddington Island lies Ledge Point, the northern headland of Port McNeil, from which a narrow ledge, covered by 3 to 5 fathoms of water, and marked by kelp in summer, extends **E NE.** for  $1\frac{1}{4}$  miles. The point is moderately high and slopes gently toward the water.

**Port McNeil** enters the Vancouver shore in a **W SW.** direction, and is 2 miles deep by about  $\frac{3}{4}$  mile in width. It is bordered by a sandy beach which forms a tidal flat  $\frac{3}{4}$  mile wide at the head of the port. Nearly a mile **S SW.** from Ledge Point, and about 2 cables off the southern shore, lies Eel Reef, which covers at  $\frac{1}{2}$  flood.

If intending to anchor in Port McNeil keep in mid channel, and anchor with Ledge Point bearing about **NE.**, about  $\frac{1}{2}$  mile distant, in 5 to 6 fathoms, sandy bottom. In leaving the port, bound to the

## QUEEN CHARLOTTE SOUND.

westward, stand to the eastward until within  $\frac{1}{2}$  mile of Haddington Island before attempting to reach to the northward of Ledge Point.

The northern shore of Broughton Strait, W. of Cormorant Island, is formed by the southern shore of Malcolm Island. This island is about  $13\frac{1}{2}$  miles long W SW. and E NE., and about 2 miles in breadth. The shores are mostly low, with sandy beaches. The eastern extreme of the island, called Donegal Head, is high, cliffy, and bordered by a beach; *there are strong tides* in its vicinity. About 7 miles westward from Donegal Head is Dickenson Point, connected by a bar with Haddington Island.

Immediately to the westward of Dickenson Point is Rough Bay, a small indentation in which vessels may anchor in 8 fathoms. Five miles W SW. of this bay is Pulteney Point, the southwestern extreme of the island; about 1 mile W. from the point is a shoal patch of  $4\frac{1}{2}$  fathoms, extending  $\frac{1}{2}$  mile in a westerly direction and marked by kelp. The western shore of Malcolm Island for  $\frac{1}{4}$  mile off shore is foul and marked by kelp.

## GENERAL DIRECTIONS FOR BROUGHTON STRAIT.

In navigating the strait from the eastward, when abreast Beaver Cove, in mid channel, a W.  $\frac{1}{2}$  S. course, passing not more than 2 cables S. of Cormorant Island until its western point bears N. by E., clears the Nimpkish Bank. The southwestern shore of Haddington Island should be rounded within  $\frac{1}{2}$  mile, to avoid the reef off Ledge Point.

When the N. shore of Cormorant Island is open off Haddington Island E. by N., a vessel may steer out of the strait in mid channel. Only small craft should go to the northward of Haddington Island, and it is not recommended for vessels of any size to attempt to beat through Broughton Strait.

## QUEEN CHARLOTTE SOUND.

This extensive arm of the sea connects the inner channels N. of Vancouver Island with the Pacific Ocean. Under this name are generally included the waters between Vancouver Island on the S., Penfold and Holford islands on the E., and the mainland to Cape Caution and the parallel of Cape Caution to the meridian of  $128^{\circ} 30'$  W.

These boundaries give the sound a maximum length of about 60 miles and a width varying from 10 to 25 miles. The northern and northeastern shores are little known, and are bordered by innumerable rocks and islands; but along the southern shore are two broad and navigable channels to the Pacific.

Broughton Strait enters the sound at its southeastern part; thence to Thomas Point the Vancouver shore extends W. by N. 9 miles; it is low, without notable indentations, with a continuous sand or shingle beach, and with foul ground extending off shore nearly 1 mile in some places and marked by kelp.

Beaver Harbor is situated 9 miles W. by N. from the western termination of Broughton Strait, on the Vancouver shore, with an entrance 3 miles across, including the islands, and reaching to a depth of 2 miles. The harbor is formed by a group of 4 or 5 islets and numerous rocks, extending across and within the entrance, which lies between Thomas Point on the SE. and Dillon Point on the NW. The shores of the harbor are low, with a gently shelving tidal flat extending nearly  $\frac{1}{2}$  mile out from the beach at the southern bight of the harbor. The southwestern shore is flanked by a range of 7 noticable hills, from 400 to 640 feet high; there is good anchorage in the S. and W. parts of the harbor, but northeasterly winds send in a heavy sea, rendering it impossible to land on the S. shore sometimes for days together.

On the southern shore is a large Indian village and Fort Rupert, a trading post originally established by the Hudson Bay Company. Near the trading post is a tract of cleared land, where it is said that fruit and vegetables suited to the climate may be produced in abundance.

Tides.—At Beaver Harbor it is high water, F. and C., at  $0^h 30^m$ , with a rise of about 16 feet.

Thomas Point, the southeastern headland of Beaver Harbor, is low and rocky, with some rocks lying  $\frac{1}{4}$  mile to the westward of it.

## DANGERS IN BEAVER HARBOR.

Two-thirds of a mile N NW. from Thomas Point is Deer Island, 240 feet high, wooded, about  $\frac{1}{2}$  mile in diameter, and of a rounded shape; SE. of it a short distance are some islets and rocks. The channel between Deer Island and Thomas Point is clear of dangers, and is somewhat less than  $\frac{1}{2}$  mile wide. From the northwestern shore of the island a broad reef extends to the NW. about  $\frac{1}{4}$  mile, having 1 to 10 feet on it, and marked by kelp.

Moffat Rock, 8 cables to the westward of Thomas Point, is 3 cables off shore just at the outer edge of the bank, and uncovers at low water.

Round Island,  $\frac{1}{2}$  mile N. by E. of Deer Island, is small, but high and conspicuous from the eastward.

Peel Island, in the northern part of the harbor, is  $\frac{3}{4}$  mile long NE. and SW., and about  $\frac{1}{4}$  mile broad; it is about 200 feet high and wooded; between it and the W. shore of the harbor is a passage

called Dædalus Passage, 2 cables wide in the narrowest part, with not less than 17 fathoms of water;  $\frac{1}{2}$  mile N. of Peel Island are the Charlie Islands, 2 in number, and small. There is a good passage into the harbor close along the E. side of Peel Island, which is steep-to.

The Cattle Islands, which lie in the middle of the harbor, are small and connected at low water;  $1\frac{1}{2}$  cables S. of them is Shell Islet; on it is the Astronomical Station of the Admiralty Survey.\* One cable south of Shell Islet lies a reef awash at high water.

About  $\frac{1}{4}$  mile westward from Shell Islet is a shoal patch with  $3\frac{1}{4}$  fathoms; and W SW. about  $\frac{1}{2}$  mile from the islet is Cormorant Rock, covered at high water and having 4 to 6 fathoms close to.

Dillon Point, the northwestern headland of the harbor, is much broken, wooded, and rocky, with rocky shores, and some small islets lying close inshore to the SE. of it. The point separates Beaver Harbor from Hardy Bay.

#### DIRECTIONS FOR BEAVER HARBOR.

Beaver Harbor is easy of access to either steamers or sailing vessels. There are 3 passages into it, but the southeastern one, between Thomas Point and Deer Island, is the best, and is generally used, being wide enough for a vessel to beat through; the only caution in entering it is that Thomas Point should not be approached nearer than 2 cables, in order to avoid the rocks off its northwest part. With Thomas Point bearing about SE., steer for Shell Islet, and anchor in 10 to 12 fathoms, about 2 cables SE. of it, with Fort Rupert bearing SSE. and Thomas Point E. or E. by N. Good anchorage and better shelter from northwesterly winds may be had in from 6 to 9 fathoms to the westward of the Cattle Islands; but in rounding Shell Islet give it a berth of about 2 cables to avoid the reef S. of it.

Tides.—It is high water, F. and C., in Beaver Harbor at 0<sup>h</sup> 30<sup>m</sup>, and the rise and fall is 15 to 16 feet.

Hardy Bay, to the westward of Beaver Harbor and separated from it by Dillon Point, runs in a southerly direction for 4 miles; its breadth at the entrance is 2 miles, narrowing to the head, where it terminates in a narrow creek  $1\frac{1}{4}$  miles long and 2 to 4 cables broad, with a sand bank running off its head for  $\frac{3}{4}$  mile. The shores of the bay are rugged, and off the W. side, near the head, are some outlying rocks. The soundings in the outer part of the bay vary from 40 to 100 fathoms, and there is no anchorage except in the small creek at the head, which is difficult of access and should not be used by a stranger.

Off the NE. point of the bay, about  $\frac{3}{4}$  mile from the shore, are the Masterman Islands, small, and 4 in number; foul ground exists between them and Dillon Point.

Duval Point, the western headland of Hardy Bay, is on an island, separated by a narrow passage from the Vancouver shore. It is also the southeastern headland of the entrance to Goletas Channel.

From the eastern part of Queen Charlotte Sound there are several channels and passages by which the western part can be reached.

North Channel and Ripple Passage are out of the way and are not used, beside the fact that the outlying waters off the mainland E. of Cape Caution are known to contain many rocks and reefs.

The widest and most direct passage is by the New Channel. Goletas Channel, and some one of the passages leading from it, are however, most generally used.

From the western entrance of Broughton Strait, in mid-channel, with Pulteney Point bearing NE., the course to the eastern entrance to New Channel is NW. by W.  $\frac{1}{4}$  W., 14 miles, and to the eastern entrance to Goletas Channel it is WNW.  $\frac{1}{4}$  W.,  $12\frac{1}{2}$  miles.

Goletas Channel extends from Duval Point on the E. to Cape Commerell on the W., along the northern shore of Vancouver Island, a distance of about 22 miles, with a variable breadth of from 1 to  $2\frac{1}{2}$  miles. The northern shores are formed by a chain of islands, through which there are several navigable passes; the shores are high, rugged, and mostly steep-to, except in the western part, and may generally be approached to a  $\frac{1}{4}$  mile. The soundings throughout the channel to its western entrance are very deep, ranging from 80 to 190 fathoms; but at the western entrance the bottom suddenly rises from 40 to 7 fathoms, and in one place to less than 3 fathoms, forming Nahwitti Bar, which stretches completely across the channel, and prevents, in a great measure, the rising of any heavy sea in the channel during westerly gales.

Tides.—It is high water, F. and C., throughout Goletas Channel at 0<sup>h</sup> 30<sup>m</sup>, with a range of about 13 feet.

The current in the eastern part runs from 1 to 3 knots; but near the western entrance in the vicinity of the bar it is much stronger, reaching 2 to 5 knots, and turning shortly after high and low water by the shore.

There are four anchorages within the channel; Shushartie Bay on the S. side, and Port Alexander, Shadwell Passage, and Bull Harbor on the N. side. Dense fogs are prevalent in the channel at all seasons.

At its eastern entrance Goletas Channel is separated from New Channel by the Gordon group of numerous small islands running in an E. and W. direction for 5 miles; they are high, rugged, and

\* Lat. 50° 42' 36" N. Long. 127° 25' 07" W.



steep-to. A rather remarkable peak called **Miles Cone**, 380 feet high, appears on Doyle Island, the easternmost of the group, which is slightly more than 2 miles northward from Duval Point.

About 1 mile S. from the Gordons is Duncan Island, about  $\frac{1}{2}$  mile in diameter and 300 feet high.

A little more than 1 mile to the northward of Duncan Island are the Noble Islets, 30 feet high, between which and the Gordons some dangers exist.

**Christie Passage.**—NW. about 1 mile from the Noble Islets, and between Gordons group and Balaklava Island, is the S. entrance to Christie Passage, which is the one most favored by the pilots; it is  $\frac{1}{2}$  mile wide, running in a N NW. direction, connecting Goletas with New Channel. Its shores are free from dangers, except two shoals extending about 2 cables eastward from George Islet, of small extent, on the Balaklava shore; these shoals are marked by kelp, and have 9 fathoms close to them; they have upon them 1 and 3 fathoms, respectively. The depth in the passage in mid channel varies from 35 to 45 fathoms.

The tide currents run through with a strength of 1 to 3 knots, the flood to the southward.

Vessels for Christie Passage may pass on either side of the Noble Islets, though the W. passage only is recommended.

**Balaklava Island** separates Christie Passage from Browning Passage; this island is  $2\frac{1}{2}$  miles long and averages  $\frac{1}{4}$  mile in width; it is rugged and irregular, showing three prominent peaks lying NW. and SE.

**Browning Passage** is about 3 miles long, trending NW. and SE., and about 2 cables wide in the narrowest part; there are some small rocks and islets along its shores and off its SE. and NE. points, but it is deep, and a mid-channel course through it is free from dangers. The tide is very weak in this passage. At the southern entrance, Boxer Point, the southwestern headland of the passage, is also the southwestern headland of Port Alexander, a long and narrow indentation of Galiano Island; this port is a mile and  $\frac{2}{3}$  in length in a NW. and SE. direction, and less than  $\frac{1}{2}$  mile wide; there is a small islet in the middle of it  $\frac{1}{2}$  mile from the entrance, and another close to Boxer Point.

This port is easy of access to steamers and sailing vessels, requiring no particular directions for entering, and affords good anchorage in 12 to 13 fathoms,  $\frac{1}{2}$  mile from its head; and well sheltered from all but southeasterly winds, which make no sea. The shores are bold and rocky, and it is protected to the northeastward by a high and narrow peninsula of Galiano Island.

**Galiano Island**, the largest of those that contribute to form the northern shore of Goletas Channel, is of triangular shape, about 8 miles long and over 3 miles broad, its longest side facing to the southward. Its northern and eastern shores are very much broken; the southern and northwestern shores are nearly straight and with few indentations.

About  $4\frac{1}{2}$  miles W. from Boxer Point is a small cove that would afford shelter to small craft only in westerly winds;  $1\frac{1}{2}$  miles to the westward from the head of the cove, and somewhat more than  $\frac{1}{2}$  mile inland from the southern shore of the island, lies Mt. Lemon, a remarkable conical peak 1,200 feet high. Within a mile of the western extreme of the island are 2 peaks between 700 and 800 feet high,  $\frac{1}{3}$  mile apart N. and S., the southern peak being close to the shore. These form the so-called Maginn Saddle, used as a landmark in the navigation of Shadwell Passage.

On the southern shore of Goletas Channel,  $14\frac{1}{2}$  miles W. from Point Duval, lies Shushartie Bay, a small indentation about  $\frac{1}{2}$  mile in extent either way, and open to the northward. Its shores are high except at its southern extremity, where there is a tidal flat nearly  $\frac{1}{4}$  mile in width, behind which is a little low land. Close to its eastern headland is a small rocky islet known as Halstead Islet. There is a very limited but fairly sheltered anchorage just inside the NE. point of the bay in about 13 fathoms, at a distance of a cable off shore; but from the steepness of the bank it should only be considered as a temporary stopping place.

About  $1\frac{1}{2}$  cables W. of Halstead Islet is Dillon Rock, which covers at one-quarter flood, and constitutes a danger to vessels entering from the eastward.

#### DIRECTIONS FOR SHUSHARTIE BAY.

If Dillon Rock be covered do not steer for the anchorage until the easternmost peak of Shushartie Saddle, a remarkable double-topped mountain 1,900 feet high, situated S. of the bay, comes in line with the village at the head of the bay, S.  $\frac{3}{4}$  W., when the course in lies on that bearing until the NE. point of the bay bears E. by N., when the vessel should be headed for the eastern shore, anchoring immediately; 14 fathoms are obtained about 1 cable distant from the bank, with the headlands of the bay bearing NE. and NW. by W., respectively.

**Shingle Point**, 2 miles W. of Shushartie Bay, is low; a beach runs off it a short distance. Westward of this point it is difficult to land except in fair weather.

Shingle Point is one of the leading marks for crossing Nahwitti Bar.

**Cape Commerell**, west southwest  $5\frac{1}{2}$  miles from Shingle Point, is the northernmost point of Vancouver Island, and the southern extreme of the western entrance to Goletas Channel. The cape is low, and fringed about with rocks, which extend in some cases 2 cables off shore. There is an Indian village on the eastern side of the cape.

To the eastward of Cape Commerell the Vancouver shore forms a large bight, 3 miles wide and about 1 mile deep, with  $2\frac{1}{2}$  to 6 fathoms water over a rocky bottom unsuitable for anchorage. The

shoaler patches in this bight are marked by kelp, and are known as Tatnall Reefs. In the southwestern part of the bight lies Weser Islet, 8 feet high and  $\frac{1}{4}$  mile off shore.

**Shadwell Passage** is between Galiano and Hope islands, and connects Goletas Channel with the open waters of Queen Charlotte Sound. The northern portion of Shadwell Passage is divided into two parts by Vansittart Island; the **NE.** portion is known as Bate Passage, and is a wide, clear channel. That part of Shadwell Passage **W.** of Vansittart Island is filled with reefs, and it is recommended to always use Bate Passage, which is free from all dangers, and the tide less troublesome.

At the southern entrance to Shadwell Passage is Willes Island,  $\frac{1}{4}$  mile in diameter, 200 feet high, steep-to and close to the western extremity of Galiano Island; **SE.** by **S.** of it  $\frac{1}{4}$  mile is Slave Islet, low and of small extent.

The western headland, bold, 200 feet high, rocky, fringed with kelp, and presenting a cliffy appearance, is known as Heath Point. There is an Indian village near this point. About 2 miles northeastward is Turn Point, about midway through the passage, backed by a summit about 300 feet high and of a similar character to Heath Point; between these points are some indentations with rocks and islets.

From Turn Point **NW.** by **N.**  $\frac{1}{2}$  **N.** is Cape James, a rocky bluff 90 feet in length; it is the **NW.** headland of the passage; foul ground showing much kelp occupies the bight between it and Turn Point.

Center Island,  $\frac{1}{2}$  mile **N.** by **E.**  $\frac{1}{2}$  **E.** from Turn Point, is small with a rock immediately to southward of it, and another, Suwanee Rock, on which the U. S. S. Suwanee was wrecked in 1868, lies 190 yards **W.** by **S.**  $\frac{3}{4}$  **S.** from the high-water mark of Center Island; it dries 4 feet at very low spring tides, and renders the passage **W.** of Center Island unsuitable for any except small vessels locally acquainted.

About these rocks and the shoals on the Hope Island shore is much kelp. There is a clear passage only on the side eastward of Center Island, and this is not particularly recommended.

Vansittart Island, in the middle of the northern part of the passage, is nearly 1 mile long,  $\frac{3}{4}$  mile wide, and 260 feet high. To the westward from it, rocks, islets, and foul ground extend for more than  $\frac{1}{2}$  mile.

One Tree Islet, 4 cables **W.** of Vansittart, is small, about 40 feet high, and has a single tree on its summit which is very conspicuous when seen from the northward, and of great use in identifying the passage. This islet may be approached close-to on its **W.** side, but between it and Vansittart Island and to the northward are rocks and foul ground; and off the northern part of Vansittart the Nicolas Islands, two wooded islets 70 feet high, stand off about  $\frac{1}{4}$  mile.

The soundings in the southern part of Shadwell Passage are from 40 to 100 fathoms, decreasing rapidly to the northward, reaching as little as 7 fathoms near One Tree Islet.

**Tides.**—The flood tide runs southward through the passage with a strength of about  $4\frac{1}{2}$  knots, while the ebb runs about 2 knots in the contrary direction. Between Vansittart and Center Islands are numerous whirls while the tide is running strong.

This passage can be used by steamers and sailing vessels, but it is not recommended at any time.

To the eastward of Vansittart Island is Bate Passage, deep and nearly straight; it is easy to navigate, and is in every respect preferable to Shadwell Passage, and the tide forms no strong ripples.

#### DIRECTIONS FOR SHADWELL PASSAGE.

The **S.** peak of Maginn Saddle (on the **W.** end of Galiano Island) in line with the **E.** end of Center Island bearing **S SE.**, leads through the **N.** entrance of Shadwell Passage, passing  $\frac{1}{2}$  mile **E.** of Cape James (the **NW.** entrance point), and 300 yards **W.** of Breaker Reef, in 9 to 17 fathoms of water.

For Bate Passage the navigator has only to keep in mid channel.

On the **W.** side of Shadwell Passage is Hope Island, moderately high, with very irregular shores; it is 6 miles long and  $3\frac{3}{4}$  miles wide, trending **E NE.** and **W SW.** It is the westernmost of the islands forming the northern shore of Goletas Channel. The southern shore of the island is steep and may be approached to  $\frac{1}{4}$  mile, but off Mexicana Point, its western extremity, foul ground runs off 3 cables. The sea breaks heavily on its **N.** and **W.** sides, off which are several islets and rocks, the 10-fathom curve reaching 2 miles from shore in some places.

**Bull Harbor** has its entrance on the **S.** side of Hope Island, 2 miles inside the entrance of Goletas Channel; though small, this harbor affords a very secure and land-locked anchorage. It runs in a northerly direction for  $1\frac{1}{2}$  miles, nearly across Hope Island, its head being only separated from the **N.** shore of the island by a narrow strip of low land 400 feet wide. Its breadth at the entrance is  $\frac{1}{2}$  mile, contracting to 1 cable at half the distance to the head, after which it again increases to nearly 2 cables. Indian Island,  $1\frac{1}{2}$  cables **N.** of the narrowest part of the entrance, is small, but completely shuts in the harbor to the southward, leaving a passage to it on the eastern side 1 cable in width; between the island and the **W.** shore is only 11 feet of water.

The anchorage is to the northward of Indian Island, in 4 or 5 fathoms. There is only room for one or two vessels of moderate size to lie moored. The entrance is narrow and tortuous, and difficult of access to long vessels.

**BULL HARBOR—NAHWITTI BAR.****DIRECTIONS FOR BULL HARBOR.**

Pass in to the eastward of Indian Island, and moor as soon as the vessel is north of it, with anchors **N.** and **S.**

Westward of Bull Harbor the coast of Hope Island is rocky and fringed with kelp; in westerly winds the sea breaks heavily along it.

To the southeastward from Mexicana Point, between it and Cape Commerell, extends the Nahwitti Bar, narrowest somewhat to the northward of mid channel, and expanding toward either shore, especially to the southward, where it includes the Tatnall Reefs. This bar is of sandstone formation, rising suddenly from 40 to 9 fathoms on the eastern side, the depth increasing very gradually to the westward. The narrowest portion of this bar, between the 10-fathom curves, is about  $\frac{1}{2}$  mile in width. On the bar northward of the Tatnall Reefs the depth varies from 6 to 9 fathoms.

In heavy westerly gales the sea breaks on this bar from shore to shore. Over the bar the tide runs from 2 to 5 knots, flood to the eastward. This passage is not often used.

**DIRECTIONS FOR NAHWITTI BAR.**

Bound to the westward through Goletas Channel, steer in mid channel until west of Bull Harbor, after which keep Lemon Point off Galiano Island open north of Shingle Point, bearing **E.** by **N.**, until Mexicana Point bears **N.**, when a vessel will be to the westward of Nahwitti Bar.

The shores of Hope Island may be approached to within  $\frac{1}{4}$  mile until nearing Mexicana Point, which should not be approached nearer than  $\frac{1}{2}$  mile to avoid the heavy swell and uneven ground.

In standing to the southward a vessel should tack when Lemon and Shingle points are in range about **E.** by **N.**, to avoid Tatnall Reefs.

For vessels bound to the eastward a course **E.** by **N.**, with Lemon Point open to the northward of Shingle Point, leads over the bar in the deepest water well to northward of Tatnall Reefs.

In making for the entrance, the Vancouver shore should not be approached within the 10-fathom curve until Cape Commerell bears **SE.** by **E.**, or **S.** of that.

If the weather be clear, in crossing the bar in the deepest water, Mt. Lemon, a high, conical peak, should appear nearly midway between Shingle Point and Heath Point, on the opposite shore, or nothing to the southward of midway between them.

A danger in making Nahwitti Bar from the westward is Hecate Rock; it lies **W.**  $\frac{1}{2}$  **S.**  $1\frac{1}{2}$  miles from Cape Commerell, and  $\frac{3}{4}$  mile off shore; it covers at  $\frac{3}{4}$  flood, and the sea breaks heavily on it.

**NEW CHANNEL.**

To the northward of Goletas Channel, and separated from it by the islands which form the **N.** shore of the latter, is an extensive clear channel to the Pacific Ocean, known as New Channel; it is about  $12\frac{1}{2}$  miles long, and varying from  $1\frac{1}{2}$  to 4 miles in breadth. Its least depth, in the shoalest part, is 60 fathoms near the eastern entrance, and its shores, except in the vicinity of the Gordons, may be approached to nearly  $\frac{1}{2}$  mile. Generally a more or less heavy swell sets through New Channel from the westward, and with the exception that there is more room for a large vessel to work in or out than in Goletas Channel, there is no particular reason for using it in preference to the latter, unless if in running before a westerly gale the sea should be breaking across Nahmitti Bar, making that passage dangerous.

Doyle Island, the southeasternmost of the Gordon group, and at the southeast point of New Channel, is  $\frac{3}{4}$  mile long, and, as before described, has a remarkable peak called Miles Cone, 380 feet high, near its center. There are some small islets off its **E.** point.

The **N.** side of the Gordon group to Crane Islets is steep-to and may be approached to  $\frac{1}{4}$  mile.

The Crane Islets are small, 30 feet high, and steep-to, there being 100 fathoms of water at a cable distance; they lie  $2\frac{1}{2}$  miles westward of Boyle Island, and about 3 cables **N.** of the Gordon group.

Boyle Island,  $1\frac{1}{4}$  miles **W.** of Crane Islets, and  $\frac{1}{2}$  mile **N.** of Hurst Island, is small; at  $\frac{1}{2}$  mile **NW.** of it is the Grey Rock, which covers at  $\frac{1}{4}$  flood, and is a danger to vessels beating through this channel. The best mark to clear this rock is to keep the Crane Islets just touching the **N.** side of the Gordon group **E SE.**  $\frac{1}{4}$  **E.**, which leads nearly  $\frac{1}{2}$  mile **N.** of it; when Boyle Island bears **S.** a vessel will be clear **E.** of it; and when the **SW.** and **NE.** points of Christie Pass are open **S.**  $\frac{3}{4}$  **W.**, a vessel will be clear to the westward of it.

The **N.** shore of Balaklava Island is rugged, and  $\frac{1}{2}$  mile **NW.** from its **NW.** point, at the **N.** entrance to Browning Passage, are three low islets 6 feet above high water, called Cardigan Rocks, with Croker Rock  $1\frac{1}{2}$  cables **NW.** of them.

The **N.** shore of Galiano Island is also rugged, but it may be approached to  $\frac{1}{4}$  mile.

Westward of Cape James, the northeast point of Hope Island, the shore is generally rocky, and the sea breaks heavily along it. Do not approach it within  $\frac{1}{4}$  mile.

The Walker group, at the **NE.** part of New Channel, where it is from 2 to 3 miles wide, is composed of a number of small islands and rocks, covering an extent of 6 miles in a westerly direction, and 2 miles broad; the highest is about 300 feet above the sea; among them are several small creeks



Table I.

Fig. 1.

South end Table Island N E  $\frac{1}{4}$  N.

(From British Adm. Chart No. 2436, 1872)



Mt. Leimon

Leimon Pt.  
Honor Pt.

Shaggle Pt.

Leading Marks over Nelson's Har.  
(From British Adm. Chart No. 559)

and bights, which would afford shelter to boats or even to small craft. Some rocks extend along their S. side some distance off shore.

Castle Point, at the SE. extreme of the group, is bold, cliffy, and steep-to; with no bottom at 60 fathoms 2 cables S. of it.

White Rock, at the S. extreme of the Walker Group, lies 2 miles W SW. from Castle Point; it is 4 feet above high water, and there are 40 fathoms  $\frac{1}{2}$  cable S. of it. Between White Rock and Boyle Islet a strong tide race usually prevails.

Nye Rock, off the S. end of Schooner Passage, at the W. part of the group, covers at high water; it lies W.  $\frac{1}{2}$  N. 2 $\frac{1}{4}$  miles from White Rock, and may be approached to 2 cables on its S. side, but large vessels should not stand inside it to the northward.

Redfern Island, the SW. island of the Walker Group, is about  $\frac{1}{2}$  mile long and  $\frac{1}{4}$  mile wide;  $\frac{1}{2}$  mile SE. of it are some rocks just above high water, and surrounded by kelp, as also to the NW.; its S. side ought not to be approached within 2 cables.

Prosser Rock, 2 miles W. by N.  $\frac{3}{4}$  N. from Redfern Island, is small, about 2 feet above high water, and may be approached to 2 cables. Nearly 1 mile further, in the same direction, is Bright Islet, 100 feet high, to the N. and NE. of which are some reefs and small islets.

Sunken Rock, on which the sea breaks in bad weather, lies midway between Bright and Pine islands, the latter bearing NW.  $\frac{1}{2}$  W. distant 1 $\frac{1}{2}$  miles.

Pine and Storm Islands.—These islands, with their surrounding islets and reefs, occupy the middle of the western approach to Queen Charlotte Sound, and form the eastern margin of dangers between Shadwell Passage and Cape Caution.

Pine Island, bold, rocky, and covered with trees, about 250 feet high, is 4 $\frac{3}{4}$  miles NE. by N. from Cape James, off Hope Island.

Storm Islands are a narrow chain of islands, lying in an E. and W. direction, about 2 miles long, and form a most useful landmark when crossing Queen Charlotte Sound. The western of these islands bears from Pine Island NW. by N. 3 miles; from Cape James, N.  $\frac{3}{4}$  E. 6 $\frac{3}{4}$  miles; and from Cape Caution SE. by S. 8 miles. There are no outlying dangers beyond 3 cables. The tops of the trees are from 150 to 200 feet high, and on the western part a single tree is conspicuous.

Blind Reef, on which the sea breaks in heavy weather, extends nearly across the passage between Pine and Storm islands; close to the western edge of Blind Reef there are 17 to 40 fathoms of water. The breaker can generally be heard in still, foggy weather.

#### SAILING DIRECTIONS FOR NEW CHANNEL.

If the wind be fair, a mid-channel course about W. by N. will take a vessel clear. If beating through, when between the Walker and Gordon groups, keep  $\frac{1}{2}$  to  $\frac{1}{2}$  mile S. of the southern shores of the former, and on nearing the Grey Rock, when standing toward the southern shore, avoid opening the Crane Islets N. of the Gordon Group, ESE.  $\frac{1}{4}$  E., until the E. and W. points of Christie Passage come open S.  $\frac{3}{4}$  W., when a vessel will be clear to the westward of the rock; and if going E., when Boyle Islet bears S. she will be E. of it. In the vicinity of the Galiano and Hope islands, tack about  $\frac{1}{2}$  mile off shore, and keep outside of Shadwell Passage and Roller Bay; when W. of Pine Island do not bring it east of E. by N.

#### QUEEN CHARLOTTE SOUND, WESTERN PART.

From the western end of New Channel, and from the various passages of Goletas Channel, two courses are open to the navigator bound to Dixon Entrance, or to the N.

One of these, Hecate Strait, is a broad sheet of water, extending between the Queen Charlotte Islands on the W., and the islands of the Columbian Archipelago on the E. Its length from the Scott Islands [off the W. end of Vancouver Island], to its northern entrance, abreast the Butterworth Rocks, is about 220 miles; it gradually diminishes in width from 90 miles at Cape St. James [the southern point of Queen Charlotte Islands], to 20 miles at the northern entrance. It has not been fully surveyed, and the few soundings that have been recorded show that the bottom is very uneven, and leads to the suspicion that a thorough survey might reveal some dangers.

Running N. from the entrance to Skidegate Inlet, the soundings show a shoal, or bar, with from 5 to 20 fathoms, extending nearly across the strait toward Goshen Island. On the line between Rose Point and East Point, of Queen Charlotte Island, and 20 miles from the former, is Margaret Rock, marked on the old charts, but not noted on the late ones; within that line are also various kelp patches, which show that the strait should be navigated with caution.

Hecate Strait presents no particular advantages except to save dark or foggy weather to one not perfectly familiar with the details of the inside navigation. Little is known of the shores of the archipelago fronting the strait from the eastward; but several harbors and channels have been examined in Queen Charlotte Islands.

There is said to be a current in Hecate Strait running 1 or 2 knots in a northeasterly direction, but it is possible that only the flood tide sets that way.

## DIRECTIONS FOR HECATE STRAIT.

Going North from Queen Charlotte Sound.—From a point  $\frac{1}{2}$  mile S. of Pine Island, a W. course for 35 miles clears the dangerous Sea Otter Group, passing 5 miles S. of the danger line; thence a course NW. by W.  $\frac{1}{2}$  W. for 83 miles, and a NW.  $\frac{1}{2}$  W. course for  $72\frac{1}{2}$  miles further, should bring Bonila Island on the starboard beam, distant 5 miles, from whence a NW. course carries clear into Dixon Entrance.

These courses make no allowance for the current, which is said to set to the northward and eastward 1 or 2 knots. In thick weather, with a strong southerly wind, allowance should be made for the natural drift to the northward.

The principal dangers near these courses are on the E. side, except at the N. end of the strait, when Margaret Rock and Rose Spit should be guarded against.

Tides in Hecate Strait.—In Hecate Strait the flood tide comes from the southward. In Dixon Entrance, the flood, coming from the westward around North Island, sets along the Masset shore across Hecate Strait for Brown Passage, spreading for about 15 miles around Rose Point toward Cape Ibbetson (Edge Passage), where it meets the flood from the southward; consequently between Rose Point, Cape Ball, Cape Ibbetson, and thence SE. for 15 or 20 miles, the tides are irregular.

The course and rate of the tidal streams are not regular, being greatly influenced by the winds. At full and change they run with great strength. The time of high water, after the moon's passage, over the strait generally is 0<sup>h</sup> 30<sup>m</sup>.

Between Cape Murray, Percy Point, and Zayas Island the tides are the strongest and most irregular, causing a heavy and confused sea, so much so that in bad weather it has the appearance of breakers.

## THE INLAND PASSAGE.

The second course, and the one usually adopted by steamers and others desiring to make the passage from Queen Charlotte Sound to Dixon Entrance, is by way of Fitzhugh Sound, Lama Passage, Seaforth Channel, Milbank Sound, Finlayson and Grenville channels, and Chatham Sound.

## DIRECTIONS FOR THE NAVIGATION OF QUEEN CHARLOTTE SOUND.

From the Southward.—After clearing Nahwitti Bar, at the W. entrance of Goletas Channel, as previously directed, from the position of Cape Commerell bearing S.  $1\frac{1}{2}$  miles, the course across the western part of Queen Charlotte Sound, to pass W. of Egg Island 1 mile, is N.  $\frac{3}{4}$  W. 22 miles.

From a position at the northern end of Bate Passage, midway between Vansittart Island and the N. point of Galiano Island, the course, to pass 1 mile W. of Egg Island, is NW.  $\frac{3}{4}$  N.,  $19\frac{5}{8}$  miles.

From a position  $\frac{1}{2}$  mile N. of Scarlett Point, at N. entrance to Christie Pass, steer W NW.  $\frac{1}{4}$  N. 8 miles, which passes to southward of Pine Island  $\frac{1}{2}$  mile; thence steer NW.  $\frac{1}{4}$  N. 17 miles to pass 1 mile W. of Egg Island.

From the W. end of New Channel, with Redfern Island on starboard beam, N.  $\frac{3}{4}$  mile, steer W NW.  $\frac{1}{4}$  W. 7 miles to Pine Island on starboard beam,  $\frac{1}{2}$  mile distant; thence steer NW.  $\frac{1}{4}$  N. to pass 1 mile W. of Egg Island.

From the position 1 mile W. of Egg Island the course is N NW. 11 miles to the entrance to Fitzhugh Sound.

Tides.—In these courses no allowance is made for currents, for which in this locality there is no accessible data. The flood tide in Queen Charlotte Sound is said to set to the eastward at the rate of 2 knots per hour. The soundings vary from 40 to 80 fathoms. The establishment, near the entrance to Smith's Inlet, is said to be 1<sup>h</sup> 00<sup>m</sup>, with a rise of from 11 to 14 feet.

Cape Caution, the NW. entrance point of Queen Charlotte Sound, is of moderate height, and level, the tops of the trees being about 200 feet above the sea; the shore is white and of granite formation, with a few rocks off it. The land NE. of the cape rises gradually in a distance of 5 miles to Coast Nipple, 1,350 feet high; 2 miles to the eastward of which lies Mt. Robinson, 2,100 feet high.

Blunder Bay, the open indentation between Cape Caution and Neck Point, has, in its northern part, Indian Cove, where the Indians rendezvous on their canoe journeys between Queen Charlotte and Fitzhugh sounds; it affords good shelter for boats only.

## DANGERS TO NAVIGATION BETWEEN CAPE CHARLOTTE AND FITZHUGH SOUNDS.

The passage to Fitzhugh Sound is between the dangerous Sea Otter Group on the westward, and on the eastward the islands, rocks, and reefs lying off the entrance to Smith Sound between Cape Caution and Cranstown Point. At its narrowest part, off Egg Island, this passage is scarcely 3 miles wide.

Westerly gales send in a heavy swell, and dense fogs are of frequent occurrence in this vicinity, and too great care cannot be taken in the navigation.

## SEA OTTER GROUP.

This group consists of several dangerous rocks, islets, and shoals, which cover a space of about 12 miles in extent N. and S., and 10 miles in an E. and W. direction. The group lies at a distance of

6 or 7 miles from the seaboard of British Columbia, fronting the coast between Cape Caution and Cape Calvert.

**Danger Shoal**, on which the sea is reported to break in heavy weather, is the southernmost outlying danger of the Sea Otter Group, and lies **W.** by **S.**  $\frac{1}{2}$  **S.** 10 miles from Cape Caution; near the center of this shoal there is a depth of 9 fathoms, with 22 fathoms close around; shoaler water probably exists.

**Virgin Rocks**, near the western limit of the group, consist of 3 white rocks, the largest of which [50 feet high], lies **NW.** by **W.**  $\frac{1}{2}$  **W.**  $7\frac{1}{2}$  miles from Danger Shoal, and 17 miles **W.** from Cape Caution. Southward of these rocks the 30-fathom line is 4 miles distant, and in a westerly direction it is 6 miles distant.

In rounding these rocks do not go inside of 30 fathoms.

**Watch Rock**, 74 feet high, and black, lies near the northern limit of the group, **N.**  $\frac{3}{4}$  **E.**,  $7\frac{1}{4}$  miles from Virgin Rock; this rock is steep-to.

**Pearl Rocks**, the northernmost of the Sea Otter Group, are comprised of several rocks above and below water, extending  $1\frac{1}{2}$  miles in a **NW.** and **SE.** direction; the largest rock [15 feet high], lies **E.** by **N.** 3 miles from Watch Rock, and the **SE.** rock, on which the sea always breaks, lies **SE.** by **E.** 1 mile from the largest rock; there are 15 to 31 fathoms water close-to on the **N.** side of Pearl Rocks, and 70 to 80 fathoms just eastward of them.

**Devil Rock**, the northeastern outlying danger, lies **NE.**  $\frac{1}{2}$  **E.**  $11\frac{1}{4}$  miles from the largest Pearl Rock, and **S SW.**  $\frac{1}{2}$  **W.** nearly 3 miles from Sorrow Islands. The sea seldom breaks on Devil Rock, and there is apparently deep water close-to around; there are from 80 to 40 fathoms between the rock and Cape Calvert.

**New Patch**, on which the sea generally breaks, is nearly 2 miles in extent, and lies **S.** by **E.**  $4\frac{1}{2}$  miles from the largest Pearl Rock.

**Channel Reef**, the easternmost danger of the Sea Otter Group, has about 6 feet over it at low water; from the center of this reef Egg Island bears **E.**  $\frac{1}{4}$  **N.**  $3\frac{1}{2}$  miles. The sea seldom breaks on Channel Reef, and there are 60 fathoms close to eastward of it.

**Hannah Rock**, the southeasternmost outlying danger, on which the sea is nearly always breaking, is situated about  $2\frac{3}{4}$  miles **S.** of Channel Reef. Hannah Rock is awash at high water, and from its center Egg Island bears **NE.** by **E.**  $5\frac{1}{4}$  miles.

**Clearing Mark.**—The **S.** extremes of Egg and Table islands in line, bearing **NE.**  $\frac{3}{4}$  **N.**, lead clear to the southward of Danger Shoal, and all other dangers of the **SE.** side of the Sea Otter Group.

#### CAPE CAUTION TO FITZHUGH SOUND.

**Egg Island** is a small, rocky, round island, 280 feet high, and is the chief landmark between Goletas Channel and Fitzhugh Sound. It lies **NW.**  $\frac{1}{4}$  **N.** 5 miles from Cape Caution. On the same line are the Iron Rocks, about 4 miles from the cape; the South Iron is marked by kelp, and seldom breaks; the North Iron dries 7 feet above low water. Eastward from the South Iron nearly a mile is a rocky patch marked by kelp and known as **Hoop Reef**.

**Egg Rocks** are a cluster of three rocky islets lying nearly  $\frac{3}{4}$  mile **W NW.** from North Iron Rock, and **S SE.** 2 cables from Egg Island; these rocks extend about  $\frac{1}{2}$  mile **N NW.** and **S SE.**, the northeasternmost rock being 30 feet high.

**Denny Rock**, a sunken rock on which the sea seldom breaks, and which is a source of anxiety in thick weather, lies  $\frac{1}{2}$  mile **W SW.** from the southernmost Egg Rock; most of these reefs show kelp in summer. The west extreme of Ann Island, open **W.** of Egg Island, leads 3 cables **W.** of Denny Rock.

**Table Island**, the largest of the islands **NW.** of Cape Caution, lies **N NE.** 1 mile from Egg Island; it is about 1 mile long **N.** and **S.**, and  $\frac{1}{2}$  mile broad, with the tops of the trees 120 feet above the sea, and nearly flat. Table Island, when seen from abreast Cape Caution, makes with two summits.

A cluster of rocks, several of which are covered at low water, extends  $\frac{1}{2}$  mile from the west side of Table Island, having 24 fathoms of water close to the outer rock.

**Ann Island**, about  $\frac{1}{2}$  mile in extent, is separated from the **N.** end of Table Island by a channel in which shelter can be found for boats.

**Cluster Reefs**, consisting of several rocky heads and shoal patches, extend from Table Island in a northerly and northwesterly direction into the entrance to Smith Sound.

**George Rock**, on which the sea breaks at low water, is the northwesternmost of the Cluster Reefs, and lies **N.** by **W.**  $\frac{3}{4}$  **W.** 1 mile from Ann Island. East of George Rock are a number of others, some of which show at low water.

**White Rocks**, 35 feet high and very conspicuous, lie  $3\frac{1}{2}$  miles **N.** by **W.**  $\frac{1}{4}$  **W.** from Egg Island, and nearly 1 mile **NW.** of Cluster Reefs.

**False Egg Island**, resembling somewhat Egg Island in shape, but much smaller, is 150 feet high, and lies 5 miles **N.** by **W.**  $\frac{1}{4}$  **W.** from Egg Island, and 1 mile **N.**  $\frac{3}{4}$  **E.** from White Rocks.

**John Reef.**—At  $\frac{3}{4}$  mile **N NW.**  $\frac{1}{4}$  **W.** from White Rocks, and 6 cables **S.** by **W.**  $\frac{3}{4}$  **W.** from False Egg Island, lies John Reef, which dries 3 feet at low water, with 9 to 20 fathoms close around.

## FITZHUGH SOUND.

**James Rock.**—At about 3 cables **W.**  $\frac{1}{4}$  **N.** from False Egg Island lies James Rock, the exact position of which is somewhat doubtful; the sea breaks on this rock at low water, and between it and False Egg Island the bottom is foul.

**Off Cranstown Point**, the southeastern headland of Fitzhugh Sound, the Canoe Rocks, in part above water, extend **W SW.**  $1\frac{1}{4}$  miles from the point; and between them and the main land to the eastward extends rocky and foul ground for  $1\frac{1}{2}$  miles; the rocks are mostly visible. Behind Cranstown Point is Open Bay, which affords anchorage in 7 fathoms, about 2 cables from the shore, during summer or with off-shore winds; but there is generally a swell in the bay, and it is only used by local craft as a temporary anchorage.

**Cape Calvert**, the **S.** extreme of Calvert Island, is the southern termination of Cape Range, 2,000 feet high. At 2 miles **N.** of the cape lies Entry Cone, 1,200 feet high, which is conspicuous and forms a mark for recognizing Fitzhugh Sound from the southward and the westward. Cape Calvert, about 350 feet high, is fronted by the Sorrow Islands, which are steep-to, of granite formation, and covered with gnarled and stunted trees. Between these islands and the cape fair shelter may be found for boats in Grief Bay; but during southerly gales a swell is more or less experienced, rendering landing difficult and sometimes dangerous. Indians resort there when traveling or engaged in hunting sea otter.

**Sorrow Islands**, situated at the pitch of Cape Calvert, are conspicuous, and an excellent thick weather mark from the cliffy formation and by being covered with stunted, weather-beaten trees.

## TO ENTER FITZHUGH SOUND FROM THE WESTWARD.

From the westward vessels bound for Fitzhugh Sound should enter by the North Passage between Sea Otter Group and Calvert Island. This passage is about 3 miles wide, with depths from 39 to 70 fathoms; Heddy Patch, with 9 fathoms water (probably less), lies in the **W.** entrance to North Passage  $3\frac{1}{2}$  miles **N.** of Watch Rock of the Sea Otter Group.

**Mark Nipple**, an isolated hill, 350 feet high, at the **SW.** extreme of Calvert Island, is a very useful land mark when approaching Fitzhugh Sound.

From seaward the Sorrow Islands are hardly to be distinguished from Calvert Island.

**Tides.**—The flood tides set to the eastward into Queen Charlotte and Smith's sound, with a velocity, at spring, of nearly 2 knots.

**Cranstown Point** lies **E.**  $\frac{1}{4}$  **S.** 5 miles from Cape Calvert; it is a rocky peninsula, with an open bay to the eastward of it, and flanked on the southwest by rocks and foul ground for 2 miles. This point and Cape Calvert form the southern headlands of Fitzhugh Sound.

## FITZHUGH SOUND.

lying between Calvert and other islands on the westward and the mainland on the eastward, extends in a general **NW.** by **N.** direction for 39 miles, with an average width of a little more than 3 miles. The soundings indicate generally deep water. The shores are in general bold and rocky, and the western shore free from outlying dangers. The slopes are steep and wooded, and the elevation of the mountains from 1,000 to 3,500 feet. A number of passages, some unsurveyed, lead to the eastward and to the westward from the sound. The tide is not strong and floods to the northward.

**Schooner Retreat**, on the **E.** side of the southern entrance to the sound, is the name given to the anchorages among a cluster of islands at the **SW.** end of Penrose Island, which here separates the sound from Rivers Inlet. The retreat affords a secure stopping place, and with care may be safely entered by steamers.

The entrance to the anchorage trends in a **N NE.** direction from the vicinity of Karslake Point, where it is about  $\frac{1}{2}$  mile wide, diminishing to about 200 yards between Sea Bluff and the Grey Islets. The protection to the entrance to the **NNW.** is principally formed by Iron Side Island, which is of irregular shape and 200 feet high. Inside the narrows Frigate Bay expands 6 cables long **NE.** and **SW.**, and about 2 cables wide, with soundings of from 5 to 20 fathoms.

The close proximity of Safety Cove makes it unnecessary for vessels to attempt the contracted entrances and anchorages of Schooner Retreat where, during **SE.** and **SW.** gales, the gusts are furious.

**Safety Cove** on the **W.** shore of Fitzhugh Sound, and 7 miles to the northward of Cape Calvert, is about 1 mile long **WSW.** and **E NE.**, and nearly  $\frac{1}{2}$  mile wide at its entrance, to the westward of which the shores of the cove extend parallel to each other at a distance of 2 cables apart. At its head is a muddy tidal flat extending out about 3 cables, with 7 fathoms close to its edge. The shores are high, rising to nearly 1,000 feet, wooded, and steep-to, except at the head. Good anchorage will be obtained in 13 fathoms, muddy bottom, in the middle of the cove, abreast a small waterfall on the **N.** shore.

Entering at night a vessel should keep in the middle of the cove, keep the lead going, and anchor as soon as 17 fathoms is reached.

During **SE.** or **SW.** gales strong gusts blow across the valley at the head of this cove, but it is a perfectly safe anchorage; it affords a safe and convenient place for vessels to wait to cross Queen Charlotte Sound, and requires no particular directions for entering.



The **N.** entrance point of Safety Cove has two small islets lying off it, which are useful in identifying it, particularly when coming from the northward.

**Kwak-shua Passage**,  $7\frac{1}{2}$  miles **N.** of Safety Cove, leads to Hecate Strait, and lies between Calvert and Hecate islands; this passage has not been fully surveyed; it has however been used by coasting vessels. Kwak-shua Rock lies nearly in mid channel at the western end of the passage; the sea only breaks at intervals on this dangerous sunken rock.

**Hakai Strait**.—Five miles **N.** of Kwak-shua Passage is Hakai Strait, which also connects Fitzhugh Sound with Hecate Strait. It is about 7 miles long in a **SW.**  $\frac{1}{2}$  **S.** and **NE.**  $\frac{1}{2}$  **N.** direction, and from 1 to 3 miles in width; it is somewhat obstructed by islands and reefs, but appears to be a good, clear passage, having over 40 fathoms water.

**Goldstream Harbor**.—At the **SE.** entrance of Hakai Passage and on Fitzhugh Sound, is Goldstream Harbor; it is of small extent, and is entered by a very narrow and somewhat winding channel; the shores are rocky and fringed with kelp; the entrance is obstructed by rocks and islets, most of which however are visible. Another entrance to this harbor from Fitzhugh Sound is by an intricate passage little more than 50 yards wide. This harbor is sometimes recommended for small vessels, but it should not be used without some local knowledge.

**Nalau Passage**, 4 miles **NW.** of Hakai Strait and between the Nalau Group and Hunter Island, is obstructed by islands, islets, rocks awash, and sunken dangers, and is useless for navigation.

On the **E.** side of Fitzhugh Sound, between Safety Cove and Hakai Passage, is a group of islands extending about half way across the sound; the most westerly one, Addenbrooke Island, is sometimes given as a leading mark from the southward.

**Directions**.—Addenbrooke Island open, and the **E.** shore of Fitzhugh Sound shut in by Cape Calvert **N NW.**  $\frac{1}{4}$  **W.** leads in midway between the Sea Otter Group and the islands and reefs **N.** of Cape Caution.

The eastern shore of Fitzhugh Sound from Addenbrooke Island,  $15\frac{1}{2}$  miles northwesterly to Kiwash Island, is abrupt, bold-to, and with few and inconsiderable indentations, which as yet are unexplored.

**Namu Harbor**.—Kiwash Island, of small extent, 200 feet high, and wooded, lies immediately off Namu Harbor; this harbor, at the **S.** entrance of Burke Canal, and 1 mile **S.** of Edmund Point, on the **E.** side of Fitzhugh Sound, is about  $\frac{1}{2}$  mile long **E NE.** and **W SW.**, and of the same width, with depths of 20 to 28 fathoms.

To the northward two contracted inlets extend about 1 mile into the mainland; Harlequin Basin is the terminal expansion of the most northerly one; the other, infested with rocks and very narrow, is called Rock Creek; the entrance to the latter, which is somewhat expanded, is marked by 2 islets, Sunday Islet to the northward, and Clam Islet to the southward,  $\frac{1}{4}$  mile distant.

Plover Island, 150 feet high, lies at the **S.** entrance, and Cliff Island at the **N.** entrance to Namu Harbor.

South Passage, between Kiwash and Plover islands, is nearly  $\frac{1}{2}$  mile wide, with 23 to 28 fathoms of water.

North Passage, between Kiwash and Cliff islands, is 3 cables wide, with 18 to 30 fathoms of water. Either passage may be used.

Whirlwind Bay is the name given to the entrance to Rock Creek, between Sunday and Clam islands.

#### ANCHORAGE IN NAMU HARBOR.

Large vessels should anchor in 20 fathoms in the center of Namu Harbor, with the **N.** extreme of Kiwash Island bearing **W.**, and the **W.** extreme of Plover Island **S.** by **E.** Small vessels may anchor in Whirlwind Bay on the **E.** side of Namu Harbor in 12 fathoms, clay, with the north extreme of Kiwash Island bearing **W.** by **S.**, and the center of Clam Island **S.**

During the autumn and winter months the anchorage in Whirlwind Bay is not recommended, as the willy-waws blow with furious strength over the mountains (3,000 feet high) in its vicinity, and it is moreover confined by Loo Rock, which has 3 feet of water on it, and lies nearly in the middle of the bay, **E NE.**  $\frac{1}{4}$  **E.**, 2 cables from the **S.** extreme of Sunday Island.

There is a large stream and an old Indian camp at Whirlwind Bay.

About 2 miles **N.** of Kiwash Island is Point Edmund, (with some islets **N.** of and near it), the southern headland of Burke Canal, which extends hence to the northward.

Across the entrance, 2 miles **NW.** by **W.** lies Point Walker, the northern headland to Burke Canal, situated on an island which is steep-to, but at a distance of 2 cables the water is not deeper than 26 fathoms, mud bottom, deepening quickly a short distance further out; a position which might be used in a fog for an anchorage; **N.** of the island are numerous reefs.

**Fog Rocks**.—From Point Walker **NW.** 3 miles are the Fog Rocks; in approaching and passing they appear at high water to be 3 in number, but are really 6, with numerous rocky heads showing at low water. The Fog Rocks are low, the highest about 20 feet, flat, and of a grayish color; the westernmost one appears to be the largest, and on its northern end is a small clump of trees. There is foul ground all around this group. These rocks, which appear nearly in mid channel from the southward, may be passed on either side, but the main route lies in mid channel **W.** of them.

The shores of Hunter Island, from Nalau Passage to the northward, show two small openings, neither of which has been surveyed; the northern one abreast Point Edmund, called Kitlik Creek, is supposed to be available for small vessels.

A third opening, 3 miles N. of the Fog Rocks, has a small islet lying off it, and has been called The Trap; it is extremely contracted, not affording room for a steamer to turn; dangers are supposed to exist in the passage around the islet, and it should be avoided.

In this vicinity the tides meet. About 2 miles further to the northward, and close to shore, is a very small islet 130 feet high to tops of trees, and known as Pointer Islet, forming a landmark to the entrance of Lama Passage, which is also marked by a conical mountain 1,000 feet high on the NE. point of Hunter Island.

Fitzhugh Sound continues some 8 miles further, but to that part is applied the name Fisher Channel; beyond that it divides into several arms which are little known.

Between Hunter and Denny islands, and marked by Pointer Islet, is the entrance to Lama Passage, extending from Fitzhugh Sound to Seaforth Channel, and describing nearly a right angle in its course.

From the entrance at the sound it takes a general W SW. direction for nearly 7 miles; thence between Campbell Island on the W. and Denny Island on the E. in a generally N NW. direction for about 7 miles until it enters Seaforth Channel.

At the first angle, Plumper Channel, a much obstructed passage, extends to the southward to Hecate Strait, between Hunter and Campbell islands.

Lama Passage is rather narrow near its eastern entrance, being only  $\frac{1}{2}$  mile wide, but it increases in width to the westward to over 1 mile. The northern shore is slightly indented, and appears to be bold-to. The southern shore, on the contrary, after the first 3 miles, is penetrated by a large number of narrow indentations, some of which afford shelter; no concealed dangers are known among these indentations.

Cooper Inlet is a name which is taken to cover most of these indentations between Harbormasters Point and Westminster Point; in fine weather anchorage may be obtained in 14 fathoms under Westminster Point by bringing it to bear W NW., and Harbormasters Point just open of the reefs off Charles Point NE. by E.  $\frac{1}{2}$  E.

Jane Creek, in the SE. corner of Cooper Inlet, is protected to the northward by Charles Point; it may be used by small vessels; northwesterly from Charles Point  $1\frac{1}{2}$  cables, extend 2 reefs, the outermost of which dries 9 feet. From Charles Point, the opposite headland of the creek, called George Point, bears S. 3 cables distant. Large vessels may anchor in 18 fathoms between the two points, but the bottom is generally rocky. For small vessels good anchorage may be had in 9 fathoms, with Charles Point in range with the E. point of Canoe Bight (on the opposite shore of the passage), NW.  $\frac{1}{4}$  W., and George Point SW. by W.

Camp Point, at the SW. extremity of Denny Island, and the turning point into the N. arm of Lama Passage, should not be rounded nearer than  $\frac{1}{2}$  mile, as the bottom is foul for a distance of 3 cables off shore with patches that uncover about 2 feet at low water springs.

From Camp Point the deepest water is nearest the Campbell Island shore to McLaughlin Bay, a small cove indenting Campbell Island about 2 miles above Ship Point. At this bay is a trading station formerly occupied by the Hudson Bay Company, also a mission station where are gathered the remnants of the Bella Bella tribe of Indians. The shores are rocky, except at the SW. corner of the bay, where a small stream comes in; this stream is the outlet of a lake that affords good trout fishing. Within the bay the soundings vary from 7 to 16 fathoms; the best anchorage is in 11 fathoms off the center of the beach about a cable off shore, with Grave Point open E. of the SW. point of Narrow Island, bearing N.  $\frac{1}{4}$  W., and Archibald Point open E. of Napier Point SE. by E.

This place is generally known to traders and coasters as Bella Bella.

A rock is noted on Indian authority to exist in Lama Passage opposite McLaughlin Bay and about  $\frac{1}{2}$  cable from the eastern shore; it has been searched for without success, and it is supposed that the original report was intended for Dall Patch, in Seaforth Channel.

There is an eddy current in McLaughlin Bay that makes the anchorage somewhat uncomfortable; at the anchorage it is high water F. and C., at 1<sup>h</sup> 00<sup>m</sup>; springs rise 14 feet.

On Denny Island,  $\frac{3}{4}$  mile N. of the anchorage at McLaughlin Bay, is Grave Point, marked by Indian graves; here Lama Passage is only 2 cables wide, but free from dangers. A mile northward of Grave Point on the E. side of the passage are the Bella Bella Islands, bare, about 15 feet high, and formerly inhabited by the Indians of that name.

Klick-tso-atli Harbor, on the N. side of Denny Island, and  $1\frac{1}{2}$  miles E. of Bella Bella Islands, is about 1 mile in extent, with depth of 2 to 13 fathoms, and affords excellent shelter for vessels of any size. Harbor Island off the NW. point of Klick-tso-atli has a reef extending 1 cable from its E. end.

The channel S. of Harbor Island is 1 cable wide, with a depth of 7 fathoms, and is suitable for small vessels; large vessels are recommended to pass N. of Harbor Island and through Wheelock Pass, which lies between a 3-fathom patch near the center of the channel and Noble Point, the NE. entrance point of the harbor off which a 3-fathom shoal extends  $\frac{3}{4}$  cable in a southwesterly direction.



Rizabugh Sound

Cape Calvert B.C.N. 4 Miles.

(From a Sketch by Geo. Davidson, Assist. U.S.C. & G.S. 1887)



False Egg I. Egg I.

Table I.

False Egg Island N. 1/2 W.

(From British Adm. Chart No. 2448. 1872)

## DIRECTIONS.

The **W.** extreme of Cypress Island, in line with the **E.** extreme of Meadow Island, **NNW.  $\frac{1}{2}$  W.**, leads through Wheelock Pass in 11 to 19 fathoms of water, and when Harbor Island bears **W.** a vessel may anchor in 12 fathoms.

Large vessels not wishing to enter Klick-tso-atli may anchor safely in 15 fathoms, with Harbor Island bearing **S SE.  $\frac{1}{4}$  E.**, distant 3 cables.

At the northern termination to Lama Passage, where it meets Seaforth Channel, it becomes considerably widened and obstructed by islands and rocks; the channel for vessels passes to the westward of all these and through Main Passage, which is about 2 to  $2\frac{1}{2}$  cables wide, with depths of 20 to 30 fathoms; care should be taken to maintain a mid-channel course.

To the eastward, Gunboat Passage, a narrow, crooked, and obstructed channel, connects the head of Seaforth Channel with Fisher Channel. It should not be attempted unless in small, handy, steam coasting vessels, and with good local knowledge.

Seaforth Channel, the main channel connecting Lama Passage with Milbank Sound, is 14 miles long, **E.** by **N.** and **W.** by **S.**, with an average breadth of 1 mile; the land on both sides is much broken by islands, with channels leading **N.** and **S.** The water is generally deep, and with Admiralty charts there should be no difficulty in navigating in ordinary weather.

On the northern end of Campbell Island, among the numerous indentations, two are indicated as harbors.

Ormidale Harbor is triangular in shape, widest at its mouth. It is sheltered by Nevay and Thornburne islands; westward from the former is a narrow but navigable channel. Thornburne Island, the easternmost of the two, is separated from Campbell Island and Nevay Island by narrow and shoal passages. The navigable entrance lies on the **W.** side of Nevay Island, and **SW.  $\frac{3}{4}$  S.**, nearly a mile from Grassy Island, 20 feet high, lying in the middle of Seaforth Channel, and forming a fair land mark. The entrance to the harbor is  $1\frac{1}{2}$  cables wide, with not less than 13 fathoms. A mid-channel course in is apparently free from dangers, and anchorage may be had 2 cables **S SE.** from Nevay Island in about 17 fathoms, sand and mud.

The passage in is longer, but the berth more commodious than in Kynumpt Harbor, lying directly to the westward.

Dall Patch, a 6-foot shoal, with a sunken rock at each end, lies  $\frac{1}{2}$  mile **N NE.** from the entrance to Kynumpt Harbor; it is marked by kelp at low water. From the center of the patch Defeat Point bears **S.  $\frac{1}{2}$  W.**, distant  $3\frac{1}{2}$  cables; Whitestone, **SW.** by **W.**, and **W.** extreme of Low Island, **S.** by **W.** A shoal of 3 fathoms extends  $1\frac{1}{4}$  cables to the westward of Dall Patch.

To avoid Dall Patch the passage on the **N.** side is that usually taken, and Grassy Island, in line with the **S.** extreme of Handyside Island, bearing **E.  $\frac{1}{4}$  N.**, leads nearly midway between Dall Patch and Regatta Reef.

To pass **S.** of Dall Patch, keep the northern shore of Campbell Island aboard, which, in this vicinity, may be approached to  $1\frac{1}{2}$  cables.

Kynumpt Harbor.—Immediately to the westward of Ormidale Harbor lies Kynumpt Harbor, which penetrates Campbell Island to the extent of about  $\frac{1}{2}$  mile in a **S SE.** direction; the entrance is  $\frac{1}{4}$  mile wide, but the harbor narrows to 1 cable at its head. The best anchorage is in 7 to 9 fathoms, with the **N.** extreme of Berry Point bearing **E NE.**, and the **W.** extreme of Low Island **N NE.**\* The western headland is marked by White Stone, a conspicuous bare rock, 12 feet high, and lying 2 cables **W.** of Kynumpt. The opposite headland is known as Defeat Point.

No directions appear necessary for entering Kynumpt Harbor, except to avoid Dall Patch, described above.

Regatta Rocks, awash at high water, lie **NE.  $\frac{3}{4}$  N.** about 1 mile from the entrance of Kynumpt Harbor.

Grassy Island, 20 feet high, with two fir trees on its western end, holds a similar relation to Ormidale Harbor.

Immediately to the westward of Campbell Island, and separating it from Dufferin Island, of the Bardswell Group, is Hecate Channel, about 1 mile wide, and 11 miles long **N.** and **S.**, leading toward Queen Charlotte Sound. Its southern end is considerably obstructed by islets and rocks.

Point George, the **NE.** point of Dufferin Island, is bold-to with land behind it rising to 1,000 feet; **W.  $\frac{1}{2}$  S.** from the point, 2 miles, is the entrance to Dundivan Inlet, an irregularly shaped bay, with a number of arms affording anchorages. The inlet contains a number of islets; it has over 38 fathoms in the entrance and 12 to 30 inside.

Idol Point, 3 miles **W.** of Point George, is bold-to, with high land behind it. From this point the shore of Dufferin Island extends **S SW.  $\frac{1}{4}$  W.** for about  $3\frac{1}{2}$  miles to the obstructed entrance to Gale Creek, which is unexplored.

From Gale Creek **SW.** by **W.  $\frac{1}{2}$  W.**  $2\frac{1}{2}$  miles is Sound Point, the **SW.** headland of Seaforth Channel. From Idol Point **W.** to Sound Point, the shores are fringed with rocks and reefs, and should not be approached nearer than  $\frac{1}{2}$  mile.

\*A rock with 10 feet water is reported to lie **SW.**, 2 cables from Low Island.

## MILBANK SOUND.

Between Sound Point and Gale Creek, at  $2\frac{1}{2}$  miles to the eastward of the point, a bank extends out about  $\frac{3}{4}$  cable from the shore. On its outer edge, which is steep-to, there are depths of 28 and 30 fathoms, decreasing to 18 and 10 fathoms close-in shore for a distance of 1 mile E. of Sound Point. Thence to Gale Creek, reefs with 9 fathoms close-to, extend about 3 cables from the shore.

During foggy weather, temporary anchorage may, with a careful use of the lead, be obtained on this bank, but it is not recommended.

The northern shores of Seaforth Channel are much more irregular in outline than the southern.

Separating Cunningham and Chatfield islands, on the northern side of Seaforth Channel, is the entrance to Deer Passage, a large unexplored opening with several islands in it. The southwestern extreme of Chatfield Island is Angle Point, a narrow, high promontory;  $\frac{3}{4}$  mile W. of this promontory are Jumble and Dearth islands. At this expansion of Seaforth Channel, Bullock and Ellerslie channels extend to the northward, encircling Yeo Island, and connected with a multitude of unexplored channels.

North from Idol Point, nearly 2 miles, on the N. side of Seaforth Channel, are numerous sunken rocks known as the Hyndman Reefs; the mainland, under the name of the Don Peninsula, from here forms the N. shore of the channel, and from this vicinity to Milbank Sound is surprisingly irregular, fringed with islets and rocks, most of which are visible. This shore should not be approached nearer than  $\frac{1}{2}$  mile.

The waters of Seaforth Channel offer no unseen obstacles to navigation, except Dall Patch, Regatta Rocks, and those in the vicinity of the shore. There is a clear passage on either side of the mid-channel islets in the eastern part. The shores are wooded and mostly low, and the high land does not attain such an altitude as near the more interior passages.

Sound Point is the SW. entrance point to Seaforth Channel; it is low and marked by a small islet close-to.

Ivory Island is the NW. entrance point; it is low and somewhat rugged. To the westward of it are some rocks.

Mathieson Channel separates Lady and Dowager islands from the mainland. At a distance of  $2\frac{1}{2}$  miles within its S. entrance, this channel is obstructed by islands, islets, and rocks; a stranger should not, therefore, attempt to proceed further. About 3 miles to the northward and eastward of Point Rankin, the SE. entrance point to Mathieson Channel, is the entrance to Port Blakeny, a rather contracted anchorage between the north end of Mary Island and the mainland. Four miles N. of Point Rankin is the entrance to Moss Passage, extending to Milbank Sound. The western part of this passage will average  $\frac{1}{2}$  mile in width, and contains on its SE. shore Morris Bay, a small indentation of Lady Island, affording anchorage to small vessels, except in westerly winds. Both these anchorages are represented on British Admiralty chart, 1462. Neither is particularly recommended.

Rat Rock, a small, low, bare rock, lies  $\frac{1}{4}$  mile WSW.  $\frac{1}{2}$  W. from Ivory Island; a reef connects it with the island.

Mouse Rock.—S.  $\frac{3}{4}$  E. from Point Rankin nearly a mile, and WSW.  $\frac{1}{2}$  W. from Ivory Island,  $\frac{1}{4}$  mile outside of Rat Rock, lies Mouse Rock, showing a *breaker* which should be avoided in entering Seaforth Channel from the NW. Vessels entering should not approach Ivory Island nearer than 1 mile until its southern edge bears to the northward of ENE.

## MILBANK SOUND.

This spacious sheet of water connects Hecate Strait with Seaforth, Finlayson, and Mathieson channels. At its western entrance, between Cape Swaine and Day Point, the sound is nearly 9 miles wide, which breadth it maintains in a NNE. direction for 5 miles; thence it trends more northerly, taking a NNW. direction for 10 miles until meeting Finlayson Channel.

The southeastern headland, formed by islets at the SW. extreme of the Bardswell Group, is Cape Swaine, from which Day Point, the northwestern headland, bears NW. by W.  $\frac{1}{2}$  W. about 9 miles distant. From Day Point rocks and wooded islets extend SSW. for 2 miles, the western island of the group called Outer Island, being round, wooded, and conspicuous.

Approaching Milbank Sound from Hecate Strait or from the southwestward, Helmet Peak on Lake Island in Mathieson Channel is conspicuous. This remarkable peak is 1,032 feet high, and bears a striking resemblance to a helmet with the sloping side toward the W. Nearing the sound the low wooded shores of Cape Swaine should be recognized; the shore northward of Cape Swaine is much broken, and the tops of the trees are about 120 feet high.

Off Day Point the outer edge of the dangers lies SSW. distant  $2\frac{1}{10}$  miles off the point, and SE.  $\frac{1}{2}$  S. distant 8 cables from the outer island. In summer kelp grows on these rocks, but disappears in winter and spring.

White Rocks.—About 5 miles within the sound, and about  $4\frac{1}{2}$  miles W. by S.  $\frac{3}{4}$  S. from Ivory Island lie the White Rocks. The southernmost of these two bare rocks is 50 feet high, and is called White Rock; N. by E. from it distant  $\frac{1}{2}$  mile lies the other smaller rock called Bare Rock, 6 feet above high water. Both are conspicuous, and lying well out in the sound, show out against the dark back ground of pine and cedar which lines the shore of Milbank Sound. A reef extends SW.  $\frac{1}{2}$  W. for  $\frac{3}{4}$  mile from the larger White Rock.

**Sound Rock**, over which the sea only breaks in bad weather, has 12 feet of water on it, and lies S. by E.  $\frac{3}{4}$  E.  $\frac{1}{2}$  mile from the smaller White Rock, and E.  $\frac{1}{2}$  N.  $\frac{1}{4}$  mile from the larger White Rock. There are depths of 50 fathoms at 1 mile eastward, and 34 fathoms close to westward of Sound Rock.

The W. shore of Milbank Sound, formed by the E. shores of Price Island, is steep and bold-to.

The E. shore of the sound is formed N. of Seaforth Channel by Lady and Dowager islands, and is infested by a multitude of rocks and islets. This shore should not be approached in foggy weather without great care.

**Vancouver Rock**.—N N W.  $\frac{1}{4}$  W. 4 miles from White Rock is Vancouver Rock, which uncovers 12 feet at low water, and is steep-to on all sides, there being depths of 13 and 14 fathoms within 1 cable of the rock. When visible this rock presents the appearance of a large whale, and is conspicuous.

**North Islet**, 150 feet high, with some stunted trees growing on its summit, and showing at high water as two islets, lies N. by W.  $\frac{1}{4}$  W.  $1\frac{1}{4}$  miles from Vancouver Rock. Three-quarters of a mile N. by W.  $\frac{1}{2}$  W. from North Islet are the North Ledges, which uncover at low water. N E. of North Islet, and close-to, are two small rocks of the same group.\*

**Beaver Bank** has 27 fathoms on it, over a bottom of sand and shells. The center of this bank lies W. by N.  $2\frac{1}{2}$  miles from Low Point of Dowager Island. The bank is about 1 mile long N. and S., with depths of 45 fathoms, gravel, at 2 cables westward, and 114 fathoms at 1 mile eastward of the bank, in mid channel between Low and Jorkin points.

A vessel meeting with a fog in this portion of Milbank Sound might find Beaver Bank of service, not only as indicating position, but also affording temporary anchorage.

**Sandstone Reef**, situated close to the shore in the northwestern portion of the sound, is a conspicuous narrow ridge, of sandstone formation, about 1 mile long in an E. by N. and W. by S. direction. The highest portion of this reef is 4 feet above high water.

#### DIRECTIONS FOR MILBANK SOUND.

**I. From the Eastward**.—On leaving Seaforth Channel keep in mid channel until Sound Point bears S SE. 1 mile, thence steer N W. by W.  $\frac{1}{4}$  W. for  $7\frac{3}{4}$  miles, or until Vancouver Rock bears E.  $\frac{3}{4}$  N., which clears White Rocks  $\frac{1}{2}$  mile, and from whence a N.  $\frac{3}{4}$  W. course for 7 miles leads clear into Finlayson Channel.

A clear passage exists on either side of the White Rocks, but that usually taken is to the northward, not approaching them nearer than about  $\frac{3}{4}$  mile.

**Alexandra Passage** lies E. of Vancouver Rock and the North Islet Group. Vessels having local knowledge make use of this passage. It is quite clear, over  $\frac{1}{2}$  mile wide, and no known dangers not shown on the charts; the soundings in the passage are 14 to 42 fathoms.

The general leading mark through the passage is Point Jorkins, in line with Low Point N. by W.  $\frac{1}{2}$  W. It is however recommended by Pender to alternately open and close these points so as to keep in mid channel.

**II. From the Southward**.—In clear weather Helmet Peak should be kept in line with White Rocks, N NE.  $\frac{1}{2}$  E., which will lead nearly in mid-channel up the sound. When within  $2\frac{1}{2}$  miles of White Rocks, if bound to the eastward, steer E. by N.  $\frac{3}{4}$  N. with Day Point astern bearing W SW.  $\frac{1}{4}$  W., or if bound to the northward a N. by W. course may be steered toward Finlayson Channel, passing to the westward of White Rocks.

In thick weather soundings S. of the line of Sound Point and Day Point will not indicate the position, and great care should therefore be taken.

On the E. side of Milbank Sound, Moss Passage and Oscar Passage, on the S. and N. sides, respectively, of Dowager Island, lead to Mathieson Channel.

The SE. extreme of an island contiguous to Lady Island terminates in a high, bold cliff called Boulder Point. Cliff Island, which lies off the SW. side of Dowager Island, at the entrance of Moss Passage, is small, 225 feet high, and its SE. extreme terminates in conspicuous white cliffs.

At the NW. angle of the sound an obstructed channel N. of Price Island called Schooner Passage connects Milbank Sound with Laredo Sound.

**Tides in Milbank Sound**.—The flood approaches from the southward and divides near the middle of the sound, one portion running toward Finlayson Channel, another toward Mathieson, and a third toward Seaforth Channel. The rate of the tide is variable, and seldom exceeds 1 knot an hour in Milbank Sound; the rate is however increased within the narrower channel to 2 or 3 knots an hour.

In the sound it is high water F. and C., at 0<sup>h</sup> 30<sup>m</sup>; springs rise about 13 feet.

**Finlayson Channel** is the main channel leading northward from Milbank Sound; it extends between Roderick and Dowager islands on the E., and the Princess Royal Islands on the W., for a distance of about 24 miles in a generally N N W. direction, directly from its entrance to Carter Bay.

\* Kelp will be seen on the surface of the water, at low water, growing on nearly every danger, sometimes in 10 or 12 fathoms, with a bottom of rocks or stones, during the summer or autumn months, but usually disappearing during winter and spring.

The first portion of the channel averages 2 miles in width, with more than 100 fathoms of water. The shores are bold-to and free from dangers. The land on both sides is from 1,000 to 3,000 feet high; except where land slides have taken place the shores are thickly wooded to a height of about 1,500 feet, the pine and cedar predominating; occasionally their dark green foliage is relieved by the bright, light green leaf of the maple.

Patches of snow in the ravines exist throughout the year; from these and from various lakes at a high altitude, cascades of remarkable height and beauty fall down the abrupt mountain flanks, and in some cases swarm with salmon in their season.

From the southern entrance of the channel Stripe Mountain is visible on the NW. angle of Dowager Island, high, pyramidal, and marked down its southern flank by a great white streak destitute of timber and soil. \* At its base is a comparatively level plateau, sparsely covered with herbage and remarkable for its absence of timber. Stripe Mountain is 2,020 feet high; its peak is less than 1 mile from the water, and northward from it Oscar Passage leads from Finlayson to the northern part of Mathieson Channel.

The depths in Finlayson Channel are from 40 fathoms, rocky, to no bottom at 153 fathoms. The former depth was found in mid channel abreast the northern end of Cone Island.

About  $3\frac{1}{4}$  miles northward of Oscar Passage are 2 small islets called the Sisters. They lie 2 cables from the eastern shore, and NW. and SE. 4 cables from each other; they are joined by ledges that uncover at low water. These islets are wooded, and are about 90 feet high.

Northwestward from The Sisters, about  $2\frac{1}{2}$  cables, is Indian Island, of irregular form, nearly 1 mile in length W NW. and E SE., and sheltering the entrance to Nowish Cove, an indentation of Susan Island. The entrance northward of Indian Island is 2 cables wide. The cove then extends in an E NE. direction for 5 cables, contracting near its head to 1 cable wide, and having on its N. shore, about 4 cables within the cove, a small bay, which affords anchorage for small vessels in 10 to 14 fathoms, sandy bottom. In the middle of the bay, and  $\frac{1}{2}$  mile northward of the cove, a peak rises to about 1425 feet.

From Nowish Cove northward, on the E. shore of the channel, about 15 miles, is Mary Cove, of small extent with about 9 fathoms of water, but open to the southward.

Between these coves are several openings leading to unexplored bays, inlets, or passages.

The western shore of Finlayson Channel, northward from Jorkins Point, is compact and bold-to, rising to nearly 2,000 feet but a short distance back.

About 7 miles northward from the point is a narrow entrance to a passage called Klemtoo Passage, between the shores of Swindle Island and the southern termination of Cone Island.

Cone Island derives its name from Bell Peak, a most peculiar conical mountain situated on the island about 1 mile northward from Bare Point, and attaining a height of 1,280 feet. The island extends somewhat more than  $3\frac{1}{2}$  miles in a NW. and SE. direction, with a width of about  $\frac{1}{2}$  mile.

Klemtoo Passage, between Cone and Swindle islands, is about  $3\frac{1}{2}$  miles long, and in some parts barely 1 cable wide. It possesses the advantage of affording anchoring ground almost anywhere, and in it the strength of the tide does not seem to exceed a knot an hour at any time. The shores of Cone Island appear bold-to, and within a reasonable distance no dangers are indicated. The opposite shores of Swindle Island, on the contrary, are considerably indented with coves of small extent, and bordered for some distance by islets.

#### DIRECTIONS.

In entering this passage it is well to keep within  $\frac{3}{4}$  cable of the Cone Island shore. The clear passage seems to be almost exactly 1 cable in width. The southern points of entrance to the passage are Bare Point, the southern extreme of Cone Island, having a rock at its base, and represented as bold-to, and Islet Point, W. by S. about 4 cables from it. This latter point consists of some small, rocky islets, connected by reefs with a small promontory, high, and parallel with Swindle Island, with which it is connected by low land, and having a small cove, with a sandy beach, W. from its southern extreme.

In line with this promontory, and between it and Base Point, off the Swindle Island shore a distance of 1 mile, is a line of islets and reefs. In the openings between them are several contracted anchorages.

Clothes Bay, lying SW. of Base Point, is a cove affording boat anchorage in 5 fathoms.

Anchorage suitable for vessels of moderate length may be had in the channel, abreast Clothes Bay, in 12 fathoms, sand and shell. A vessel using this anchorage should, however, be prepared for a foul anchor when weighing.

Tides.—It is high water, F. and C., in Klemtoo Passage at noon; springs rise 13 feet, neaps 8 feet, and the neaps range 3 feet.

One mile NW. by N. from Base Point is Berry Point, the rather high, rocky headland of Trout Bay, a cove of small extent, and having 6 to 11 fathoms near the entrance. Two streams fall into this cove.

\* Green spots are beginning to appear in this great slide, and in a few years it will show as a light green stripe instead of as now.

Wedge Point, the northern extreme of Cone Island, lies about  $1\frac{1}{2}$  miles northward of Berry Point. On the eastern side of this point, close-in, lies Wedge Rock, which uncovers at low water, and the shores about the point are fringed with kelp, extending out less than  $\frac{1}{2}$  cable.

Half a mile **N NW.** from Cone Island is Jane Island, 1 mile long **NW.** and **SE.**, and less than  $\frac{1}{2}$  mile wide.

These islands are separated by South Passage,  $\frac{1}{2}$  mile wide, and having from 11 to 37 fathoms, rocky bottom.

Between Jane Island and the portion of Swindle Island to the westward of it, Klemtoo Passage is continued, widened to  $\frac{1}{2}$  mile, and deepened to over 40 fathoms.

At the southern extreme of Jane Island, and just within South Passage, is a large kelp patch, which nearly all disappears in winter, extending a little more than 1 cable from shore and marking a sunken rock, having from 5 to 12 feet over it.

A mid-channel course, giving a little preference to the Swindle Island shore, leads clear of this from all directions.

At the **NW.** end of Jane Island, and separating it from Sarah Island, is the North Passage. In the passage,  $1\frac{1}{2}$  cables off Jane Island, is Danger Patch, a sunken rock, marked by heavy kelp in summer. North Passage is  $\frac{1}{2}$  mile wide, with deep water; occasional tide whirls are met in the passage.

A mid-channel course leads clear in all directions.

The entire western and northern sides of Jane Island are fringed with kelp to less than  $\frac{1}{2}$  cable off shore. The **S.** end of Sarah Island is bold-to.

Sarah Island extends some 15 miles in a **N NW.** direction, and is from 1 to  $2\frac{1}{2}$  miles wide. It reaches its greatest elevation of 3,000 feet at about 4 miles from its **S.** extreme.

**Tolmie Channel.**—Between Sarah Island and Princess Royal Island, to the westward, lies the convenient, though narrow, Tolmie Channel, which reunites with the northern extension of Finlayson Channel at the **N.** end of Sarah Island. The channel is from  $\frac{1}{2}$  to 1 mile wide, with depths from 35 fathoms to no bottom at 104 fathoms. It is without serious obstructions, but has no great advantage over the main passage of Finlayson Channel.

About 3 or 4 miles northward from its southern entrance, are several unexplored openings, apparently leading toward Laredo Sound.\*

**Tides.**—In Tolmie Channel it is high water, **F.** and **C.**, at 0<sup>h</sup> 00<sup>m</sup>. The flood stream runs to the northward, and is stronger in Finlayson than in Tolmie Channel. The ebb, however, is stronger in Tolmie Channel, and runs for  $1\frac{1}{2}$  hours after slack water in Finlayson Channel. In the narrow parts of these channels, both flood and ebb streams attain a velocity of 3 knots an hour at springs.

Less than  $\frac{1}{2}$  mile southward from the northern extreme of Sarah Island, close under its western shore, a rock is noted on British Admiralty chart, 1923. It is really a small wooded islet, standing well out from the shore, at high water.†

From Mary Cove northward for 12 miles to Sheep Passage the eastern shore of Finlayson Channel has been but partly examined. There is one large opening, 1 mile wide, called Watson Bay. Two miles further **N.** is Wallace Bight, 1 mile wide, and taking a northerly direction for 1 mile. At its entrance there is no bottom at 106 fathoms.

Goat Cove, situated 4 miles **N.** of Wallace Bight, is  $\frac{1}{2}$  mile wide, and extends  $\frac{1}{2}$  mile easterly, terminating in a sandy beach and a lagoon. The soundings show 23 fathoms close to its head. A mile further **N.** is Kid Bay, 3 cables in extent, with 23 and 25 fathoms of water, surrounded by high land, with a stream falling in at its head.

Sheep Passage is nearly a mile wide and leads eastward from Finlayson Channel, just **N.** of Kid Bay. At 3 miles from its western entrance it turns northward until its junction with Mussel Inlet.

The **E.** side of Sarah Island is somewhat irregular in outline, but is bold-to;  $3\frac{1}{2}$  miles from its southern extreme there are two high water falls, and  $3\frac{1}{2}$  miles further an unexplored bay faces to the southeastward.

**Carter Bay.**—One and a half miles **NW.** from Kid Bay is situated the entrance to Carter Bay, on the shore of the mainland. This excellent stopping place lies at the head of Finlayson Channel, 26 miles within its southern entrance, and should be recognized by the high cliffs on its western shore. The bay is 4 cables wide at its entrance, abreast the anchorage ground, and extends in a northerly direction about 6 cables. The head of the bay terminates in a large stream, fronted by an extensive flat, covered at high water; this stream comes from a lake and waterfall about 1 mile back to the northward and eastward. The mountains rise to more than 2,000 feet on either hand. The soundings off the entrance exceed 38 fathoms, and in general the water is deepest toward the western shore.

The best anchorage is in about 15 fathoms, mud, in the middle of the bay, about 2 cables from shore, with the west entrance **SSW.**  $\frac{1}{2}$  **W.**, and the east entrance **SE.**  $\frac{3}{4}$  **S.** No particular directions are necessary for entering. Trout abound in the fresh-water stream, and wild fowl frequent the bay.

\* **CAUTION.**—The northern reach of Tolmie Channel looks directly into the southernmost of these openings. Care is therefore necessary when approaching from the northward not to mistake this unexplored arm for the reach leading to Klemtoo Passage.

† In Vancouver Island Pilot, Supplement, is noted Tolmie Rock, with 4 feet water lying 100 yards from the shore of Sarah Island, at 5 cables within the northern entrance of Tolmie Channel.



Mussels and other shellfish are considered poisonous in this bay.

**Hie-Kish Narrows**, about  $5\frac{1}{2}$  miles long in a general NW. and SE. direction, and  $2\frac{1}{2}$  cables to 1 mile wide, lie northward of Sarah Island, and connect Finlayson Channel with Graham Reach. Its shores are precipitous, but the north end of Sarah Island is somewhat low.

**Hewitt Rock** is  $4\frac{1}{2}$  miles from the southern entrance of Hie-Kish Narrows; this dangerous sunken rock has 10 feet of water on it, and deep water close to. At this point is an island lying close in to the Sarah Island shore, and on the east side of the narrows is a very noticeable landslide. Hewitt Rock lies on the line joining the landslide and the south end of the small island, noted above, and a little to the westward of mid channel.

Nine fathoms at low water has been noted abreast the landslide, with no bottom at 15 fathoms on either side. It is probable that there is a ridge extending clear across at this place, and of which Hewitt Rock is the highest known pinnacle.

Strong tide rips and eddies are found in this vicinity.

**Directions.**—In navigating Hie-Kish Narrows at this point keep the eastern shore close aboard. The SW. headland of Carter Bay, seen just open of the NE. extreme of Sarah Island, SE.  $\frac{3}{4}$  E., leads eastward of Hewitt Rock.

**Graham Reach**, beginning at the junction of Hie-Kish Narrows and Tolmie Channel, is about 17 miles long in a general NW. direction, and from  $\frac{1}{2}$  mile to 1 mile broad, with depths from 38 to 150 fathoms. In its general features this reach resembles Finlayson Channel.

About 2 miles north of Sarah Island, on the eastern shore, is Green Inlet; this unexplored arm takes an easterly direction at its entrance.

Flat Point is on the eastern shore, 3 miles above Green Inlet; this point is wooded, flat, and comparatively low; abreast the point, on the western shore of the channel, lies a remarkable large boulder rock.

**Carroll Island**, about  $1\frac{3}{4}$  miles above Boulder Rock, is small, low, and close in shore; it is not shown on the British Admiralty chart.

**Swanson Bay** is on the eastern shore, 7 miles above Sarah Island; abreast this bay on the opposite shore is a conspicuous waterfall. Anchorage may be had in Swanson Bay in 19 fathoms, sandy bottom, in the northern part of the bay, with the waterfall shut in with the NW. entrance point; and Flat Point shut in by the SE. entrance point.

About 6 miles above Swanson Bay is an unexplored arm on the E. shore called South Inlet.\* It is  $\frac{1}{2}$  mile wide at its entrance, and trends in a NE. by E. direction. Anchorage is reported at its head.

Two miles beyond South Inlet, on the same side, is another unexplored arm called North Inlet;† in size and direction it resembles South Inlet, and an anchorage is reported at its head.

Off this latter inlet the tides meet, the flood from the southward meeting that from Wright Sound.

From the vicinity of Swanson Bay the channel is walled in by lofty mountains ranging from 2,000 to 4,000 feet in height, with bold, rocky shores, and carries in most cases over 100 fathoms of water. Numerous waterfalls are seen on the western shore, and there are no known dangers outside of 1 cable from the shore in Graham Reach.

**Red Cliff Point** is northwestward 10 miles from Swanson Bay, on the western shore; it terminates in a conspicuous cliff of reddish-brown color; off this point the soundings shoal to 45 fathoms, and the reach widens out to  $1\frac{1}{2}$  miles, with mountains rising to 3,000 feet on either side. A lake sends a large stream into the southern bight of this expansion, where there is an Indian summer village. An unexplored bay, called Klekane, enters in on the northern side, and is reported to afford an anchorage. In the middle of the expansion is Warke Island, narrow, and  $1\frac{1}{2}$  miles long E. and W., with deep water on either side.

**Fraser Reach** extends W. by N. for  $12\frac{1}{2}$  miles from Red Cliff Point with a varying width of from  $\frac{1}{2}$  mile to more than 1 mile, with depths from 62 fathoms to no bottom at 145 fathoms.

**Land Slip Point** lies on the north shore, 4 miles from Warke Island; over this point is a remarkable land slip. On the south shore of the reach are numerous waterfalls.

**Kingcombe Point**, the turning point from Fraser into McKay Reach, lies on the south shore,  $12\frac{1}{2}$  miles from Red Cliff Point; the point is long, sharp, and conspicuous.

At Kingcombe Point the channel becomes much wider and divides into two arms; one, under the name of Ursula Channel, stretches away some 8 miles to the northward, where it again divides and takes an irregular course. At the SE. point of Ursula Channel is a small islet, near which is an indifferent anchorage called Fisherman's Cove; it is only useful for very small vessels. There is a deep gorge just N. of the cove.

**McKay Reach**, the southern arm, takes a general WSW. direction 7 miles to Wright Sound, averaging  $1\frac{1}{2}$  miles in width, with rocky shores, high land on either side, and very deep. From mid channel, abreast Kingcombe Point, the reach takes a WSW. direction for 4 miles to abreast Trivet Point; thence a SW. by W. direction to abreast Cumming Point, the NW. headland. Between Kingcombe and Trivet points a deep bay makes into the southern shore, in which the water is very

\* Khutze of B. A. chart 1923\*.

† Aaltanhash of B. A. chart 1923\*.

deep. On the **S.** side of the reach the land is lower than on the **N.** side, and near the summits of the mountains are some extensive, bare, slate-colored patches.

McKay Reach divides Princess Royal Island on the **S.** from Gribbell Island on the **N.** side. The **NW.** extreme of Princess Royal Island is called Nellie Point; the opposite headland, the **SW.** point of Gribbell Island about  $2\frac{1}{2}$  miles distant in a **NW.** by **W.**  $\frac{1}{2}$  **W.** direction, is Point Cumming.

#### WRIGHT SOUND.

This sheet of water is 9 miles long in an **E.** and **W.** direction, and  $2\frac{1}{4}$  miles wide at its narrowest part, with no bottom at 119 and 220 fathoms.

In its eastern part lies McKay Reach, and in its western Grenville Channel.

Whale Channel and Lewis Passage lead southeastward, and Douglas Channel and Verney Passage lead northward from Wright Sound.

Gill Island, on the south side of the sound, rises in a well defined snow-clad peak, called Mt. Gill, 3,000 feet in height, and is a prominent landmark.

Promise Island, on the northwest side of the sound, shows two dome-shaped mountains.

There is an anchorage at each end of Wright Sound.

**I. Holmes Bay**, situated on the eastern shore of the sound **SE.** of Nellie Point, at the entrance of Whale Channel, is 8 cables wide at its entrance, and recedes in an easterly direction for about 4 cables, terminating in a sand flat, which extends 1 cable from the head of the bay; the **N.** entrance point is high and bold; a small islet lies off the **S.** entrance point.

Anchorage will be found in 14 fathoms, sand, close to the sand flat, with the south extreme of Promise Island in line with the **N.** point of the bay, bearing **WNW.**  $\frac{1}{2}$  **W.**, and Gill Mountain in line with the **S.** entrance point, **SW.** by **W.**

The mountains northeastward of Holmes Bay have bare patches down their sides.

No particular directions are necessary. It is high water, full and change, at Holmes Bay at 1<sup>h</sup> 00<sup>m</sup>; springs rise 13 feet.

**II. Coghlan Anchorage**, at the western end of the sound, between Promise Island and the mainland, is 3 cables wide at its entrance between Camp and Thom points. Cape Farewell, the southeastern extreme of Promise Island, terminates in a high, bold cliff. A conspicuous white cliff lies midway between Cape Farewell and Thom Point.

Farewell Ledge uncovers at low water, and extends 2 cables **SE.** of Cape Farewell. This ledge is nearly steep-to, there being no bottom at 40 fathoms at 30 yards from it.

Off Thom Point rocks extend about  $\frac{1}{2}$  cable.

Harbor Rock, nearly in the center of Coghlan Anchorage, is situated  $8\frac{1}{4}$  cables **NW.**  $\frac{1}{2}$  **W.** from Thom Point; this rock is of small extent, drying 6 feet at low water, and is nearly steep-to. There is a clear passage on either side of it about 1 cable in width, and having from 8 to 17 fathoms of water.

From Observation Point, which is  $\frac{1}{2}$  mile **NW.** of Camp Point, a ledge extends out about 100 yards; from this point Harbor Rock bears **NNW.**, distant 3 cables, and the anchorage is in mid channel about 3 cables beyond the rock.

The lower part of the passage has bold shores, and depths from 10 to more than 30 fathoms, and averages about  $\frac{1}{4}$  mile in width; just beyond the anchorage it makes a rather sharp turn to the **NE.**, and under the name of Stewart Narrows it becomes less than 1 cable in width, with a depth of 9 to 15 fathoms.

Anchorage in 6 or 7 fathoms, sand, will be found with Mt. Gill just shut in with Thom Point, bearing **SE.**, and Stephens Point just open of Letitia Point, **NE.** by **N.** Or, for a long vessel, or not wishing to go beyond Harbor Rock, a berth in 24 fathoms, 2 cables **SE.** of Observation Point, may be found.

**Directions.**—When entering, keep in mid channel to avoid the ledge, which uncovers 100 yards off Thom Point. Mt. Gill in line with Thom Point, **SE.** easterly, will lead clear to the eastward of Harbor Rock, and Camp Point just open of Observation Point, **SE.**  $\frac{1}{4}$  **S.**, will lead to the westward of it.

The **NE.** entrance is used only by steamers, and the anchorage itself is not particularly convenient.

**Tides.**—It is high water, full and change, in Coghlan Anchorage at 0<sup>h</sup> 30<sup>m</sup>; springs rise 18 feet.

**Tidal Streams.**—The flood stream, from the southward, sets directly across Wright Sound, and, impinging against Camp Point, causes very strong eddies at that point, and is then deflected toward Grenville Channel. On the ebb, the main body of water from Wright Sound obtains an exit by Whale Channel. In the channels the tide runs about 3 knots at springs.

#### GRENVILLE CHANNEL.

Camp Point forms the eastern point of entrance to Grenville Channel;  $\frac{1}{2}$  mile **W.** of the point is a small island, near to shore, westward from which is a cove, which appears to penetrate farther than is shown on the British Admiralty chart, and appears to be so continued, parallel to the shore, as to cut off a narrow section nearly 1 mile in length.

About  $7\frac{1}{2}$  miles **W.**  $\frac{1}{2}$  **S.** from Point Cumming is Yolk Point, on Farrant Island, low and wooded, and forming the southwestern headland to Grenville Channel, which extends northwestward about 45 miles, and is the channel taken by vessels bound to the northward. Its width is from  $1\frac{3}{4}$  miles near the northwestern entrance, to about  $\frac{1}{4}$  mile at its narrowest part. Its southwestern shore is formed mainly by Pitt Island, and its northeastern shore by the mainland. The northeastern shore is penetrated by four partly explored openings, at nearly regular intervals from one another.

Grenville Channel is erroneously represented on British Admiralty chart 1923 A, as perfectly straight in direction from end to end, which is not the case. Davenport Point is also given somewhat too much prominence. In the vicinity of Klewnuggit Inlet the channel takes a more westerly direction than is shown on the chart.

The description of the channel on page 38, Vancouver Island Pilot Supplement, cannot be reconciled with the chart.

In Grenville Channel, the land on both sides is high, varying from 1,500 to 3,500 feet, and as a rule, densely wooded with pine and cedar. The mountains rise almost perpendicularly from the water, and cause the southern portion of this narrow channel to appear even narrower than it is (3 cables). But the general effect of so many mountains rising one behind the other renders the Grenville Channel one of the most beautiful landscapes in these waters.

At a distance of 10 to 25 miles from Yolk Point, varying with the conditions of wind, weather, and tide, the tides which have hitherto flooded to the **N.** and **W.** are met by the tides flooding in an opposite direction, from the **N.** and **W.**

Lowe Inlet is situated about 14 miles from Yolk Point on the northern shore,  $\frac{3}{4}$  mile within the inlet; anchorage may be found in 20 fathoms, muddy bottom. The entrance to the inlet,  $2\frac{1}{2}$  cables wide, lies between Hepburn Point on the **SE.** and James Point on the **NW.** At certain changes of the tide, swirls are formed in this vicinity, but of no great strength.

On the Whiting Bank, 2 cables within the entrance, anchorage may be found in from 8 to 10 fathoms, sand and shells.

Four cables **N NW.** from the entrance, and  $1\frac{1}{2}$  cables **W.** from Don Point, on the western shore of the inlet, are two rocks awash at high water.

The inlet extends to the northward over  $1\frac{1}{2}$  miles, widening to 4 cables, and afterward contracted to 1 cable by David Point, beyond which it expands to form a rounded harbor about 4 cables in extent, called Nettle Basin, into which enters a waterfall from lakes to the **NE.**; anchorage in 16 fathoms may be had in this basin.

Lowe Inlet is reported to be connected by a chain of lakes with Kit-Kia-tah Inlet and Douglas Channel.

**Don Flat**, with depths of 3 fathoms and less, fills up the deep bight **S.** of Don Point.

**Landmarks.**—On the **SW.** shore, 2 miles **SE.** of Lowe Inlet, there is a remarkable bare hill 400 feet high.

On the **S.** side of the inlet a remarkable mountain, with a conical summit, called Anchor Cone, rises to the height of 2,010 feet; from its summit the land slopes southward and northwestward; the latter spur terminates in the southeastern entrance point of Lowe Inlet, and when seen from the south-eastward appears as a long, low, wooded projection. On the **NW.** shore of the inlet, mountains, with bare summits, rise to the height of 2,000 feet.

Tom Islet, a small wooded islet, lies close to the **N.** shore, 2 cables **NW.** of Lowe Inlet.

**High Water Rocks** cover at high water, and lie close to each other in a **N.** and **S.** direction, 4 cables within the inlet, and 1 cable off the western shore. There is a depth of 23 fathoms at 100 feet eastward of the rocks.

**Soundings.**—At 2 cables within the mouth of Lowe Inlet, depths of 10 fathoms and less extend across, and is called the Whiting Bank; northward of that position the water deepens to 19 and 20 fathoms, muddy bottom; within Nettle Basin the general depths are 15 to 17 fathoms.

Anchorage for vessels of moderate length will be found on the Whiting Bank, with Anchor Cone Mountain bearing **E.** by **N.**, and Hepburn Point **SE.** by **S.** For a long vessel more convenient anchorage will be found higher up the harbor in mid-channel in 20 fathoms, with Anchor Cone Mountain bearing **SE.** by **E.**

**Tides.**—It is high water, full and change, in Lowe Inlet in  $0^h 30^m$ ; springs rise 17 feet; the tidal current is from 1 to 4 knots.

About 8 miles nearly **WNW.** from Lowe Inlet, on the northern shore, is Evening Point, from which a number of islets and rocks extend in a **NW.** by **W.** direction. In this distance Grenville Channel has a depth of from 50 to 70 fathoms. Behind Evening Point, **E NE.**, the land rises to 900 feet elevation. The point forms the extreme southerly point of Nabannah Bay, about 3 cables in extent, but practically closed to navigation by a chain of islets and rocks and foul ground, extending across the entrance and forming a barrier, behind which the bay affords from 1 to 14 fathoms.

Morning Point, the **NW.** headland of Nabannah Bay, is a moderately elevated, rounded promontory, fronting to the **SW.**, and before which extends a large area of foul ground, marked by kelp and several rocks, and called the **Morning Reef.**

The tides meet in this vicinity, the flood from Chatham Sound meeting that from Wright Sound.

Passing this point the navigator should keep the western shore of Grenville Channel aboard until Leading Island opens clear of Camp Point, which avoids the Morning Reef. Here the tides run 4 knots at spring.

Half mile N. of Morning Point is Camp Point, a small lumpy rock connected by a beach with the main shore; WSW. from it, about  $\frac{1}{2}$  cable, is a small submerged rock.

This point forms the southern headland of Klewnuggit Inlet, an irregular indentation divided into several arms, some of which have not been fully examined. The two principal of these arms have respectively NW. and SE. directions, parallel with Grenville Channel. The arm that extends NW. affords protected anchorage; the one extending SE. is obstructed by rocks and islands at a little more than 1 mile from the entrance, outside of which the soundings show no bottom at 38 fathoms.

Bare Islet, of small extent, and connected by a rocky platform with the shore of Leading Island, lies  $\frac{3}{4}$  mile NE.  $\frac{1}{4}$  E. from Camp Point. Leading Island is about 120 feet high, wooded, of triangular outline, and about  $\frac{1}{2}$  mile long NW. and SE.; it is separated from the mainland to the northward by a narrow, unnavigable passage; on its NE. side it is separated from the mainland by a passage  $2\frac{1}{2}$  cables wide; this passage is prolonged to the NW., becoming somewhat narrower and terminating in a broad tidal flat about  $\frac{1}{2}$  mile beyond the island.

The anchorage is in the middle of the passage, abreast the center of Leading Island, in 20 to 25 fathoms, muddy bottom. There are no concealed dangers, the shores are bold-to, and no particular directions are necessary for entering or anchoring.

From Camp Point to Gibson Islands, the northern shore of Grenville Channel extends about 21 miles in a generally WNW.  $\frac{1}{2}$  W. direction, and is less elevated than the southern shore; it is mostly compact and steep-to, with three unsurveyed openings on the northern shore and one on the southern.

The first of these is known to pilots as East Inlet (Kxu-geal of the B. A. chart and Vancouver Island Pilot), and probably affords an anchorage; it is  $5\frac{1}{2}$  miles WNW. from Morning Point; a rock which uncovers lies 2 cables SE. of the W. entrance point of East Inlet.

The second of these openings is known as Baker Inlet; it is not named on the B. A. chart; it has a narrow entrance, but is apparently quite extensive within, where it takes an easterly direction; there is a small islet in the entrance, which is 6 miles above East Inlet.

Four miles farther is West Inlet of the pilots (Kum-ca-lon of the chart). The entrance is about 2 cables wide and takes a northerly direction; it probably affords anchorage for small vessels; it has not been surveyed. Some small islets lie near the north shore of Grenville Channel, westward of this inlet.

The tides in this locality average about a knot an hour, flooding from the westward. At springs the flood stream in the narrow portions of Grenville Channel attains the velocity of 2 knots, and the ebb 4 knots an hour; the latter stream continues to run for  $1\frac{1}{2}$  hours after low water by the shore.

Stuart Anchorage, situated on the S. shore of Grenville Channel, 27 miles from Lowe Inlet, lies  $\frac{1}{2}$  mile westward of a long, low, wooded projection which serves to distinguish it.

False Stuart Anchorage lies on the S. shore, 3 miles E. of Stuart Anchorage; on its NW. side is a high, bold projection, which should serve to distinguish it from Stuart Anchorage. The water is deep close to the shore.

Stuart Anchorage is sheltered on the SE. by Bonwick Point, rocky, timbered, and of small extent. Four and a quarter cables W. by N.  $\frac{1}{2}$  N. from the point is Stag Rock, with a 4-fathom shoal extending out 3 cables to the northward parallel to the shore and marked by kelp. This rock dries 13 feet at low water, and a cable S. of it is another small patch which uncovers at low water and shows kelp. Stag Rock shows above water for  $1\frac{1}{2}$  hours after low water.

Between Stag Rock and Bonwick Point are 15 to 27 fathoms; between it and the Pitt Island shore the depths vary from 7 to 24 fathoms.

Anchorage will be found in 10 to 15 fathoms, rocky bottom, W.  $\frac{3}{4}$  S. 2 cables from Stag Rock, with the S. extreme of Gibson Island seen touching the N. side of Pitt Island (Calvert Point) bearing WNW. northerly.

Directions.—In proceeding for this anchorage, especially at high water, care is necessary. From the eastward keep about  $\frac{1}{4}$  mile from Bonwick Point and the S. shore of the anchorage, E. of the rock and kelp, until the mouth of the stream, which empties in near the head of the bight, bears SE., distant  $\frac{1}{2}$  mile, when anchorage may be had as above. From the westward keep the Pitt Island shore aboard and anchor as above.

Tides.—It is high water, full and change, at Stuart Anchorage at 0<sup>h</sup> 30<sup>m</sup>; springs rise 17 feet.

Just behind the peninsula that protects the anchorage is Shrimp Cove, said to have 6 or 7 fathoms of water, and to be snug for small vessels. It is not shown on the B. A. charts.

Five miles W. of Stuart Anchorage, at the NW. extreme of Pitt Island, is Hill Point, a somewhat low, symmetrical, wooded point, separating the entrances of Grenville and Ogden channels, and backed by slowly rising hills to the southward, reaching nearly 2,800 feet in height.

At this point, the end of Grenville Channel, it is nearly 4 miles wide, with a rather compact group of comparatively low, wooded islands, in the middle of the passage, called the Gibson Islands;

**NE.** of these islands, on the mainland, are numerous shallow indentations with islets and rocks at their entrances.

The western and largest of the Gibson Islands is 160 feet high and about 1 mile in extent; its shores are broken into several very small bays.

The passage **NE.** of the Gibsons has not more than 6 fathoms in it, and is infested with several shoals; for which reason the passage **S.** of the Gibsons has come to be generally used, though the Hudson Bay Company's steamers still use the eastern passage.

In the southern passage the water rapidly deepens to the westward from 40 to 80 fathoms. In going through at night, or at any time, keep not less than  $\frac{1}{2}$  mile southwestward from Gibson Island to avoid **Watson Rock**, which lies 2 cables off the **SW.** shore of that island; this rock uncovers about 11 feet at low water, and covers several feet at spring tide. There is a depth of 47 fathoms at 1 cable **S.** of **Watson Rock**.

From the broad sheet of water at the termination of Grenville Channel, three other passages open; two to the northward and westward, between Porcher Island on the **SW.** and the mainland on the **NE.**, with the Gibsons and Kennedy Islands dividing the included waters. The third, called **Ogden Channel**, between Porcher and Pitt islands, leads in a southerly direction to Hecate Strait.

**Alpha Bay**, in **Ogden Channel**, on the Pitt Island shore, is  $4\frac{1}{2}$  miles **S.** by **W.**  $\frac{1}{2}$  **W.** from Hill Point; it lies at the mouth of a stream proceeding from a deep valley, and the anchorage is off the edge of a bank at the mouth of the stream in 10 or 12 fathoms of water, about 200 yards from low-water mark. It presents no advantages as an anchorage.

Captain Brundige, in his report to the engineers of the Canadian Pacific Railway, in 1880, says: "Ogden Channel I found to be good and with very little current, only 1 knot per hour, as the main current runs through Arthur and Malacca passages. The southern entrance to Ogden Channel is divided into two channels by Spicer Island, which are named, respectively, Beaver and Schooner passages; the former of these is the best. It is about 1 mile wide, and free from rocks and shoals. With a light on White Rocks (the western point of Banks Island) and a beacon light on Tree Island, ships could enter the channel in all weathers.

"Schooner Passage is also very good; it is narrow, with a cluster of small islands, all above water, at its entrance. I consider that there is not a better locality for ships to make the land on the whole coast than here. There is a small island named Bonila (**W.** of Banks Island), which is a remarkably conspicuous object, being dome-peaked, and unlike any other on this coast, and may be seen for 20 or 30 miles at sea.

"There are other reasons for recommending shipmasters coming from the **S.** to make this point, viz: there being no inlets for 50 miles, the tide sets regularly along the coast; there is deep water of from 60 to 70 fathoms, and as soon as abreast of Bonila Island about 35 fathoms; off White Rocks, 70 fathoms, and a few miles further 40 fathoms. This is named Browning Entrance on B. A. chart 1,923.

"Ships could sail in or out of Port Fleming\* with a commanding breeze, the distance being only 18 or 20 miles. The temperature of the climate was found to be very even during a 15-day sojourn (latter part of July) in this locality; the daily mean of the thermometer was from 54° to 58° Fahr."

An examination of the chart does not fully indorse this report at this locality.

On the **E.** side of Porcher Island,  $2\frac{1}{2}$  miles **W SW.** from the larger Gibson, is Peninsula Point, the **NW.** entrance point of **Ogden Channel**; it is prominent, with a hill near its eastern extreme. Northward of the point is a bay about 5 cables wide and 1 mile deep in a westerly direction, called Oona Bay; a sounding of 8 fathoms is shown in this bay on B. A. chart 2,453, but it is doubtful if it affords a proper anchorage.

In this vicinity the surface water is often of a dirty white color, apparently coming from the Skeena River, and probably derived from the glaciers at its headwaters.

Of the two passages northward **Telegraph Passage** is continuous with the shallow passage **NE.** from the Gibsons, and has been but partially examined; it is about  $1\frac{1}{2}$  miles wide, and joins at its northern termination, the entrance to Port Essington; it is sheltered on the **W.** by the Gibson, Bedford, Marrack, and Kennedy Islands.

The southeastern portion of the passage, called **Port Fleming** by Brundige, affords anchorage nearly everywhere, apparently with good protection.

The part of **Telegraph Passage E.** of Kennedy Island does not seem sufficiently well surveyed to be advisable for vessels without local knowledge or a pilot.

There is a passage with  $2\frac{1}{2}$  fathoms least water, called the **North Skeena Passage**, which passes **N.** of Smith Island into the Skeena River.

The middle passage, between Smith and Kennedy islands, has a bar with 3 feet least water on it. It is more than likely that these soundings change after heavy freshets.

**Port Fleming** is recommended as a harbor for vessels that, from bad weather or other reasons, wish to delay crossing Chatham Sound.

\*Port Fleming is a name given by Captain Brundige to the shoal passage lying **E.** of Marrack, Bedford, and Gibson islands. It is not particularly recommended except by Brundige.

The Hudson Bay Company's steamers use Telegraph Passage, crossing to Arthur Passage N. of Marrack Island.

Bloxham Island, of small extent, lies E. of and close to Gibson Island. Lamb Islet lies 1 cable from the NE. shore of Gibson Island. Watson Rock, uncovered 11 feet at low water and covered at extreme high water, lies 2 cables off the S. shore of Gibson Island. Bloxham Shoal extends 6 cables northeastward from the SE. extreme of Bloxham Island, with depths of 1 to 3 fathoms over it.

Gunboat Harbor lies between Gibson and Bloxham islands; this small harbor, which faces the SE., affords temporary anchorage to small vessels in 4 to 10 fathoms in mid-channel, 1 cable within the entrance.

Bedford Island is of small extent and lies N NW. 5 cables from Gibson Island. Between Gibson and Bedford islands is a rock which covers at high water and is not charted. Bedford Spit extends 3 cables W SW. from Bedford Island; it dries at low water.

Marrack Island lies 5 cables N NW. from Bedford Island and is 1 mile in extent, and wooded. Marrack Rock, which uncovers, lies nearly midway between Marrack and Bedford islands.

Kennedy Island is  $5\frac{1}{2}$  miles long in a NW. and SE. direction, with an average breadth of 3 miles. The island is wooded; it rises gradually, culminating near the middle in two conspicuous peaks 2,765 and 2,470 feet high, respectively. The western and southern shores of the island are bald and little broken; the northern shores have not been examined in detail.

Cardena Bay, on the SE. end of Kennedy Island, is fronted by a mud bank which extends over  $\frac{1}{2}$  mile from shore, with depths of 5 to 10 fathoms on it. This anchorage is also recommended as a temporary stopping place; the ebb current is strong at the anchorage, and in strong winds holds a vessel broadside to the current. Ordinary southeasters do not blow home at this anchorage.

No particular directions are necessary. It is possible that this bank has changed somewhat in size and depth since the date of the survey. In the spring ice and driftwood from the Skeena River sometimes drifts down as far as the anchorage at Cardena Bay.

Lewis Island, situated 1 mile southwestward of Kennedy Island, is low, wooded, narrow, and  $2\frac{1}{2}$  miles long in a NW. and SE. direction. A narrow boat channel called Kelp Passage separates it from Porcher Island.

Arthur Passage, separating Kennedy and Lewis islands, is about 5 miles long in a NW. and SE. direction, and about 1 mile wide; it is deep and clear on the Kennedy Island side.

Herbert Reefs lie on the western side of Arthur Passage, about  $\frac{1}{2}$  mile from the NE. extreme of Lewis Island. This dangerous cluster consists of two rocks which uncover at low water, with depths of 7 and 9 fathoms between them; they lie  $\frac{1}{2}$  mile apart NW. and SE.; except in winter they are marked by kelp. There are depths of 37 fathoms and over at a cable northward and of 20 fathoms at a cable southward of these reefs; at about 1 cable N NW. from the northern rock is a shoal or rock having but 5 fathoms and sometimes showing kelp.

#### DIRECTIONS FOR ARTHUR PASSAGE.

Steer mid-channel course through the passage; the eastern and smaller Genn Island in line with the W. side of White Cliff Island, bearing NW.  $\frac{1}{2}$  W., leads clear northward of Herbert Reefs.

The depths in Arthur Passage are from 18 to 63 fathoms, mud; the flood tide runs to the NW. from  $\frac{1}{2}$  to 1 knot an hour.

Lawson Harbor, on the NW. end of Lewis Island, is about  $\frac{1}{2}$  mile long NW. and SE. and about 3 cables wide; anchorage for small vessels may be found in 4 fathoms water, in mid-channel, about 1 cable within the entrance.

Elliott Island is low and wooded, about  $1\frac{1}{2}$  miles long in a N NW. and S SE. direction, with a greatest breadth of about 1 mile.

Between Elliott and Lewis islands is Bloxham Passage, leading to Chismore Passage; it is about 2 cables wide with a depth of 21 fathoms in mid-channel.

Elizabeth Island is nearly 3 miles long in a W NW. and E SE. direction, with an average width of about  $\frac{3}{4}$  mile. With the exception of a hill, 334 feet high, near its eastern end, this island is low and wooded.

Chalmers Anchorage lies on the NW. end of Elliott Island. Anchorage may be obtained in 13 to 14 fathoms, 2 cables from Francis Point, the NW. extreme of the island, with that point seen in line with the S. extreme of White Cliff Island, bearing NE.  $\frac{1}{2}$  E.

The passage between Elliott and Elizabeth islands is obstructed by rocks and reefs, though a narrow, navigable channel can be found when aided by local knowledge.

Chismore Passage, between Porcher Island and Lewis, Elliott, and Elizabeth islands, is about 4 miles long in a W NW. and E SE. direction, and from 2 to 5 cables wide, with depths from 4 to 21 fathoms, mud.

Elizabeth Rock, which uncovers at low water, lies 1 cable off the south shore of Elizabeth Island, 1 mile within the western entrance of Chismore Passage.

Anchorage may be obtained in Chismore Passage, in mid-channel, in 7 to 10 fathoms, 2 cables off the S. shore of Elliott Island, with Genn Islands seen midway between Elliott and Elizabeth islands,

## CHATHAM SOUND.

bearing NW. by W. The usual entrance to the anchorage in Chismore Passage is by Bloxham Passage, for which no particular directions are necessary.

At the NW. entrance of Arthur Passage is **White Cliff Island**, situated nearly midway between Kennedy and Elliott islands, and somewhat more than  $\frac{1}{2}$  mile from the latter; the island is about  $\frac{1}{2}$  mile long N. and S., its S. extreme terminating in a high, bold, white cliff, where marble has been quarried.

**White Cliff Ledge**, marked by kelp, extends 2 cables southward of White Cliff Island. There is a depth of 30 fathoms, mud and shells, at 1 cable southward of this ledge.

**Cecil Patch**, seldom marked by kelp, has 4 fathoms upon it, and lies W. 1 mile from the S. extreme of White Cliff Island. There are depths of 7 and 18 fathoms at 100 yards from this patch.

**Bamfield Islands** are a group of small islands lying 2 cables off the N. shore of Elizabeth Island.

**Genn Islands** consist of two small, wooded islands, about 120 feet high, lying close together in an E. and W. direction. The easternmost, and smaller island, lies NW.  $\frac{1}{2}$  W.,  $2\frac{1}{2}$  miles from the S. extreme of White Cliff Island.

**Bribery Island**, a small, low, bare rock, lies W. by S., 8 cables from the western Genn Island.

The **Lawyers** consist of two principal islands and several smaller ones, about 1 mile in extent NW. and SE., and wooded; the eastern and smallest of the group lies W. by S.,  $\frac{1}{2}$  mile from Bribery Island. **Cruise Rock**, of small extent, covers at  $\frac{3}{4}$  flood, and lies W.  $\frac{1}{2}$  N., distant 3 cables, from the western Lawyer.

## CHATHAM SOUND.

This extensive sheet of water is about 38 miles long in a general NW. by N. and SE. by S. direction, and is from 7 to 14 miles wide.

It lies between the Tsimpsean Peninsula on the E. and Stephens and the Dundas islands on the W., the northwestern portion of the sound washing the southern shores of Alaska.

In the middle of the southern portion of the sound lie two groups of islands (Rachael and Lucy islands), together with other detached islets and rocks, especially on the NE. shore.

At the northern end of Chatham Sound, nearly abreast Port Simpson, there are two clusters of low, rocky islets (**Connis and Pointer rocks**), which render that portion of the sound dangerous to navigation under certain conditions, and divide the sound into two navigable channels (**Main and Oriflamme Passages**).

**Connis Rocks** consist of one large and several small rocks, nearly in the middle of Chatham Sound, abreast Port Simpson. The southernmost and highest rock, 15 feet above high water, is bare, and from it rocks extend 2 cables in a northerly direction. The summit of this rock lies WSW.,  $5\frac{1}{2}$  miles from the N. extreme of Finlayson Island, and SW. by S.  $3\frac{3}{4}$  miles from the Pointers. There are depths of 81 fathoms, 91 fathoms, and 92 fathoms at the distance of 1 mile SE., SW., and NE. of these rocks, respectively.

The **Pointers** are a dangerous cluster of bare rocks, 3 feet above high water, about 2 cables in extent in a N. and S. direction. The southernmost and highest rock lies N NW., distant 3 miles from the N. extreme of Finlayson Island. Soundings of 40 fathoms, with no bottom, at  $\frac{1}{2}$  cable westward, and 12 fathoms, rocky bottom, at 1 cable eastward of the Pointers are noted.

There is a third navigable channel 1 mile wide between North Dundas Island and the chain of small islands and rocks, of which Green Island is the southernmost.

Chatham Sound communicates with Hecate Strait by three channels, Edye Passage lying in the SW. corner of the sound.\*

**Brown Passage**, S. of the Dundas Islands, though comparatively wide, has strong and irregular tides near its western end; and the Hammer Rocks, awash at high water, lie nearly in mid-channel. It is also somewhat embarrassed by Stenhouse Shoal. It is, however, the channel usually taken if bound from Chatham Sound to the western part of Dixon Entrance directly.

**Dixon Entrance**, the third channel, lying N. of the Dundas Islands, is about 5 miles wide, and is the channel usually taken by vessels proceeding northward into the waters of Alaska from Chatham Sound. A fourth channel exists between the North and Middle Dundas islands; it has not, however, been fully surveyed, but it is reported as being a good and safe channel.

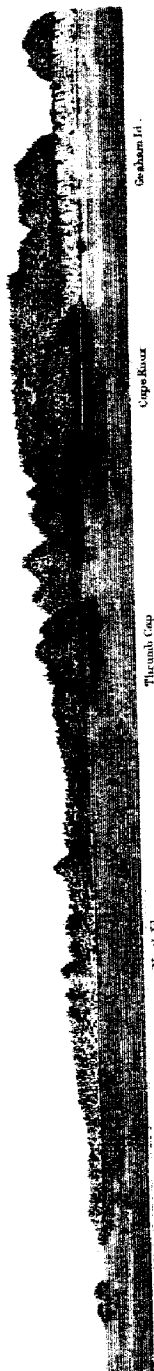
The various mountain peaks afford most excellent landmarks when visible.

On the South Dundas are four conspicuous peaks called Four Peak Range, the eastern and highest of which is 1,400 feet high.

On the eastern side of the sound, northward of Metla Katla, Mission Mountain and Deer Mound, of rounded form, will be seen rising from comparatively low land to the height of 1,300 and 2,300 feet, respectively; and Mount Oldfield, lying E. of Metla Katla, is 2,300 feet high. Mount McNeil, on the N. side of Wark Channel, has a snow-clad summit of conical shape 4,300 feet high.

On the W. shore of the sound a conspicuous hill of oval shape (**Coast Mound**) will be seen on Middle Dundas Island, and a chain of wooded islets called **Moffat Islands**, of a peculiarly dark color, fringe its shore.

\* For description, see Vancouver Island Pilot—Supplement.



Entrance to Cook Bay Cape Knox N.E. by E. & E.  
*(From a sketch by Ingraham in 1792)*



Entrance to Cox Strait Lacy I. S.E. by E. & E. 4 Miles.  
*(From a sketch by Ingraham in 1792)*



Near the **NE.** extreme of Dundas Island, Table Hill, with a flat summit, rises to the height of 700 feet, and is conspicuous; southward of Table Hill a mountain rises to a height of 2,500 feet, called Thumb Peak.

The islands and rocks in the northern portion of Chatham Sound are, as a rule, bare and conspicuous.

Northward of Metla Katla, ledges which uncover at low water extend to the westward, in many places to the distance of 2 miles from the eastern shore. On the western shore of the sound, also, there are several off-lying, detached, sunken rocks, with deep water close to them.

The **Connis Rocks** and the **Pointers**, being low and bare, render the central portion of the sound dangerous in the night or in thick weather.

Northward of Metla Katla Bay, during a fog, or if uncertain of position, the eastern shore of Chatham Sound should not be approached under 70 fathoms, nor the western shores under 40 fathoms.

**Soundings.**—The general depths in the southern part of the sound are from 10 to 66 fathoms; the former depth being obtained on Alexandra Patch, nearly in the middle of the sound, to the northward of Rachael Islands; northward of Metla Katla Bay the water deepens.

There are numerous anchorages in Chatham Sound, of which the best are off Woodcock's Landing, at **N.** entrance to Skeena River, Metla Katla Bay,\* Duncan Bay, Big Bay, Pearl Harbor, and Port Simpson, all on the eastern side; on the western side are Refuge Bay, at the **N.** entrance of Edye Passage, and in Qlawdzeit Anchorage, at the **N.** end of Stephen's Island.

Port Simpson only will be described here; for the others, reference is made to the Vancouver Island Pilot and Supplement.

**Rachael Islands** consist of two islands about 1 mile in extent in a **NW.** and **SE.** direction, wooded, and about 200 feet high; they lie nearly midway between the Tsimpsean Peninsula and Stephens Island.

**Green Top Island** is small, 15 feet high, and bare, except a patch of grassy shrub on its summit; the islet lies **NW.** by **W.**  $\frac{1}{4}$  **W.**, distant  $4\frac{1}{4}$  miles from the western island of the Lawyers.

**Kinnahan Islands** are two in number, each about  $\frac{1}{2}$  mile long, lying close together in a **NE.** and **SW.** direction; these islands, which lie about 1 mile from the shore of the Tsimpsean Peninsula, are wooded, and are about 200 feet high; they lie  $1\frac{1}{4}$  miles **NNW.** from Green Top Island.

**Gull Rocks**, three in number, are about 30 feet high, bare, and lie off the **N.** entrance to Edye Passage, **WNW.** 3 miles from Porcher Island.

**Alexandra Patch** is nearly circular, 1 mile in diameter within the depth of 20 fathoms. This bank has depths of 10 to 17 fathoms over a bottom of mud and sand; the eastern edge of the patch is 1 mile **N.** of the north Rachael. There are depths of 46 to 50 fathoms, mud,  $\frac{1}{2}$  mile eastward and northward of the patch.

**Lucy Islands** are a group of islands and high-water rocks; the largest islands are wooded. This group, which lies nearly in the middle of the sound, abreast Metla Katla Bay, is about 1 mile in extent in an **E.** and **W.** direction. The eastern and largest island is 200 feet high, and lies **NW.** about  $5\frac{1}{4}$  miles from the north Rachael. This group is of great use to navigators when making Metla Katla or standing up the sound in thick weather, as being comparatively free from danger on the east side, they may be approached close-to.

A ledge of rocks, which partially uncovers, extends from 4 to 9 cables southward from the Lucy group, the outer rock lying **S.** 1 mile from the peak of the eastern island.

#### SAILING DIRECTIONS FOR CHATHAM SOUND.

From Grenville Channel the usual passage is **S.** of White Cliff Island. Take a mid-channel course up Arthur Passage, favoring somewhat the Kennedy Island shore, until abreast a large landslide under Elizabeth Peak on Kennedy Island; from that point, being about 3 cables off the Kennedy Island shore, steer **NW.** by **W.**  $\frac{1}{2}$  **W.**, with Bribery Island just open on the port bow, for about  $2\frac{1}{4}$  miles, or until Parry Point of De Horsey Island is well open of Georgy Point of Kennedy Island. This course clears White Cliff Ledge and Cecil Patch, each 2 cables, passing between them. Thence **W.**  $\frac{1}{4}$  **N.** through Malacca Passage for  $5\frac{1}{4}$  miles, or until the Northwest Lawyer is in range with Georgy Point, when change course to **NW.** by **W.** into Chatham Sound, and a distance of 12 miles will bring the eastern Lucy Island on the port beam, about 1 mile distant.

These courses pass to the southward of the Genn Islands, Bribery Island, and the Lawyers.

From the position of  $2\frac{1}{4}$  miles **W.**  $\frac{1}{4}$  **S.** from the Lawyers, if bound to Kaighanee Strait or Bucareli Sound, the **W.**  $\frac{1}{4}$  **N.** course through Malacca Passage may be continued to Brown Passage, passing about  $\frac{1}{2}$  mile **S.** of the Rachael Islands, and continuing until in line between Hammer Rocks and the North Breaker, **NW.** of Osborne Island, from whence a course can be laid as necessary to avoid the Stenhouse Shoal, which is reported to be  $1\frac{1}{4}$  miles in extent, with about 7 feet of water

\* Metla Katla was formerly the home of a large and prosperous part of the Tsimpsean tribe of Indians, being also a mission station of the English church. In 1887 nearly all the Indians of the place, under the leadership of Rev. Mr. Duncan, a missionary, migrated to Alaska and established themselves at Port Chester, and built there a new village which they called New Metla Katla.

on it, and lying W. by S.  $5\frac{1}{2}$  miles from Hammer Rocks, which are dangerous and awash at high water, with depths of 12 and 32 fathoms close-to; there are several patches that uncover, and are marked by kelp, in the group.

**North Breaker**, on which the sea usually breaks, is the outer known danger extending NW. from the Tree Knob Groups, on the S. side of Brown Passage.

From the same position, off the Lawyers, if bound to the northward, steer NW. by W. about 12 miles, or until the east Lucy is on the port beam, distant about 1 mile. Thence, if bound to Port Simpson, take a N NW. course until up with the NW. end of Finlayson Island, or until Lizzie Hill bears NE., when a NE. course carries in through Inskip Passage clear of all dangers; and when Parkin Island comes out, inside of Birnie Island, NW., a SE. course leads to the anchorage off the end of the wharf.

The other channels into Port Simpson are referred to in Vancouver Island Pilot Supplement.

The position of Port Simpson has been carefully determined by a series of observations by the Coast and Geodetic Survey, extending over several years. The Observation Station which is locally well known and marked is in

Latitude.....	54° 33' 28".4 N.
Longitude.....	130° 25' 30" W.

Variation in 1881, 27° 54' E.

From the position of 1 mile NE. by N. from the Lucy Islands, if bound to Tongass, in Alaska, steer N NW.  $\frac{5}{8}$  W., which leads in mid-channel through Main Passage, which is nearly 3 miles wide between Connis Rocks and the Pointers. This course heads for Haystack Island at the entrance to Tongass Passage. (For directions for Tongass Passage, see page —.)

Steamers intending to stand directly up Revillagigedo Channel generally take the passage between North Dundas and Green Island, steering NW. for this purpose from the Lucy Islands.

On the E. side of the channel, which is about 1 mile wide, is Green Islet, small, about 40 feet high, and covered during the summer with long grass. There is a small, bare rock lying close northward, and another close southward of it.

**Grey Islet**, a small, bare rock of a greyish color, 30 feet above high water, lies N. nearly a mile from Green Islet.

**A sunken rock**, with 6 feet of water upon it, lies W NW. 1 mile from Grey Islet. There are depths of 19 and 27 fathoms at a cable distance from this rock.

**A sunken rock**, with 4 feet of water upon it, lies S., distant 3 cables from Grey Islet.

Both of these sunken rocks show kelp.

Continuing.—When abreast Green Islet steer NW. by N. till Whitly Point, on Dundas Island, and marked by a small islet close to shore, is abeam; from whence a NW. by W.  $\frac{3}{4}$  W. course leads  $\frac{1}{2}$  mile off Boat Harbor Point of Cape Fox Peninsula.

The B. A. charts note a deep indentation on the N. end of Dundas Island, off which lie the Gnarled Islands, a group of wooded islets about 1 mile in extent; they are about 150 to 250 feet in height, and the eastern islet lies W.  $\frac{1}{2}$  N., distant  $2\frac{1}{4}$  miles from Whitly Point.

This locality was visited by Captain Brundige in 1880, who gives the following notes on Dundas and Zayas islands:

"I put into a small harbor at the N. end of North Dundas Island. It was stated that there was no anchorage here, but I found a small river which extended into the island 5 miles or more, where I remained all night, and the next morning put to sea. At the N. end of Dundas Island there are seven small islands named Gnarled Islands, and reported to have foul ground about them; but this was found incorrect, as sounding showed not less than 45 fathoms close to them all around. To the W. of North Dundas Island is a small one named Zayas, about  $3\frac{1}{2}$  miles long and 2 miles broad; there is a good channel between Dundas and this island which steamers bound to Queen Charlotte Islands frequently take."

# THE COAST OF ALASKA.

## THE COAST AND INLAND WATERS OF THE ALEXANDER ARCHIPELAGO.

### DIXON ENTRANCE TO CROSS SOUND.

The main channels of commerce at present used and touching at the various settled points of the territory, are, by the inland passages, as follows:

Touching first at Tongass\* the route then follows the Revillagigedo Channel to and through Tongass Narrows to Clarence Strait, and by Stikine Strait to Port Wrangell, making detours to visit Port Chester and the various fishing stations en route. From Port Wrangell the route continues to and through Wrangell Strait, which with local knowledge is navigable by vessels of any class that can be used in these waters, and through Frederick Sound and Stephens Passage to Juneau and Douglass City, on Gastineau Channel, at the **E.** end of Douglass Island. Thence again by Stephens Passage to the **W.** end of Douglass Island; if bound to the head of Lynn Canal pass up Favorite Channel; if bound to Sitka pass through the Saginaw Channel down Chatham Strait and by Peril Strait, making detours to Glacier Bay and Hoonyah, or into Hood's Bay if bound to Killisnoo.

Vessels sometimes pass out Sumner Strait, round Cape Decision and up Chatham Strait, or continue outside directly to Sitka, or other outside ports.

The irregularity of the channels passing through the Alexander Archipelago is such as to render it impracticable to take them up for description in the order given above, but, instead to take up the various portions of the archipelago in geographical sequence, from the **S.**, northward, by groups naturally distinguished among the islands, and from the shore of the mainland seaward, or from **E.** to **W.**

The archipelago, as a whole, extends in a generally **NW.** and **SE.** direction more than 250 miles; the inland waters, which may be said to belong to this system, extend at least 100 miles farther. The greatest breadth from the mainland to the ocean is about 80 miles.

An approximate estimate puts the number of islands in the archipelago at 1,100; but it is probable that there are many more than that.

The topographical features of the islands of **SE.** Alaska are similar to those of the mainland to the eastward, but less elevated.

Most of the islands are high, the peaks and ridges showing a remarkable uniformity in general altitude. A few peaks rise conspicuously above the rest, but these are marked exceptions. The country is exceedingly rough and broken, the sharper inclinations facing, as a whole, toward the mainland. The higher summits are usually sharp, notched, irregular, and showing little, if any, modification by erosion. The lower summits are more frequently somewhat rounded, but, together with the flanks of the higher, are so covered with a dense growth of timber as to conceal most of their characteristic features.

The snow line in mid summer reaches an altitude varying, according to local conditions, from 2,000 to 5,000 feet. Glaciers are formed in favorable localities, such as are abundantly afforded by narrow gorges of the coast ranges. Toward the northern part of the archipelago, on the continental shore, where the lofty ridges above the snow line supply the necessary feeders, these glaciers attain great size, and even reach the water side. On the islands of the archipelago, however, the land does not usually reach a sufficient altitude to retain snow throughout the year. From the great amount of rainfall, at certain seasons, fresh water is readily obtainable in all parts of the archipelago, and there is no difficulty in procuring wood for fuel, and timber suitable for small spars, and for most purposes of construction and repair.

\* The custom house at this place was abolished in 1889.

## DIXON ENTRANCE.

The hydrographical characteristics form a parallel to the topographical features above mentioned. The continuation of the steep inclines and narrow gorges below the sea level has resulted in that unrivaled system of narrow straits, with deep soundings, which characterizes the NW. coast of America from Puget Sound to Cape Spencer. To many of these contracted passages the term "canal," employed by Vancouver, is eminently applicable. The rugged nature of the ridges and peaks, and the singular absence of plains or extensive plateaus is paralleled by the numerous rocks and reefs, surrounded by deep water, and the general absence of extensive shoals, except at the mouths of streams or rivers fed by glaciers.

## DIXON ENTRANCE.

The boundary line between the United States and British Columbia runs E. and W. through Dixon Entrance.\*

This broad sheet of water separates the Columbian Archipelago on the S. from the Alexander Archipelago on the N.

Vessels from sea bound to Port Simpson, B. C., to Tongass, Alaska, or to Wrangell, by way of Clarence Strait usually enter here; it is practicable, however, to enter S. of Queen Charlotte Islands by Hecate Strait, and by Brown or Edye Passages into Chatham Sound.

## FOR DIXON ENTRANCE,

from sea, a course should be laid for Cape Muzon. In clear weather the Queen Charlotte Islands and the high land of Prince of Wales Island will be seen, and also Forrester Island.

Queen Charlotte Islands are generally described as a compact archipelago, separated by wide water-ways from the islands which fringe the shore of the mainland of British Columbia to the W., and the coast of the southern extremity of Alaska to the N. The islands may be regarded as a partly submerged mountain range, being a continuation, northwestward, of that of Vancouver Island and the high region of the Olympian Mountains of the northern angle of the State of Washington.

A line drawn from the southern extremity of the islands to their northwestern point has a bearing of N. 25° W. (true). The islands are included in north latitude between 51° 15' and 54° 15', and in west longitude between 131° 02' and 133° 05'. The extreme length is 156 miles.†

The group is of triangular shape, with the apex to the SE. The northeastern part is level and attractive, the rest more or less broken and mountainous.

Cape Knox is the NW. extreme of Graham Island, of the Queen Charlotte group, and is represented as a bold, somewhat elevated, narrow and sinuous point, extending about 1½ miles from a bit of low ground, and in a nearly SW. by W. ½ W. direction. From its extremity in a general SW. direction for 4 miles, extend three bare rocks or pillars. Cape Knox, from some points of view, appears as an island. The bight to the southward of it appears to have rocky shores. It has been named Lepas Bay. But little is known of the west coast of the Queen Charlotte group.

North Point lies 4½ miles N. by W. ¾ W. from Cape Knox; it is practically the southwestern headland of Dixon Entrance. Its geographical position is—

Latitude .....	54° 15' 00''
Longitude .....	132° 56' 30''

There are some rocks and a small islet close to it, but apparently no outlying dangers. It is moderately low, and forms the northwestern extreme of North Island, which is about 5 miles long WNW. and ESE., and nearly 2½ miles broad; this island is moderately low and covered with a scattering growth of trees.

A small, high, round island, covered with trees, lying rather close to North Island, and NE. ½ N. from Cape Knox, is a prominent object in approaching; it is called Thrum Cap. The shores of the island are bold-to.

## CLOAK BAY AND COX STRAIT.

Between North Island and the NW. point of Graham Island lies Cloak Bay and Cox Strait. Cloak Bay is about 3 miles long E. and W., and 2½ miles wide. It is protected from all except westerly winds. Cape Knox forms the southern headland of the entrance, from which Lacy Island, the northern headland, bears NW. by N. ½ N. 3 miles. There are from 30 to 17 fathoms in the

(\*) " \* \* \* Commencing from the southernmost point of the island called Prince of Wales Island, which point lies in the parallel of 54° 40' north latitude and between the 131st and 133d degree of west longitude (meridian of Greenwich), the said line shall ascend to the north along the channel called Portland Channel, as far as the point of the continent where it strikes the 56th degree of north latitude; from this point the line of demarcation shall follow the summit of the mountains situated parallel to the coast as far as the point of intersection of the 141st degree of west longitude (of the same meridian); and finally, from the said point of intersection, the said meridian line of the 141st degree, in its prolongation as far as the Frozen ocean."—Art. I, treaty concerning the cession of the Russian Possessions in North America by His Majesty, the Emperor of all the Russias, to the United States of America.

† From Report on Geological Survey of Canada, 1878-79.



Rose Pt. N  $\frac{1}{4}$  E 18 Miles.  
(From Tahienkoff)



North Island N  $\frac{1}{4}$  E 8 Miles.  
(From Dixon's Voyage)

middle of the bay, bottom sand, gravel, and shells. Some rocks, on which the sea breaks only in heavy weather, lie some distance off the North Island shore, and there are also a couple of remarkable pointed islands on this side.

At the **SE.** angle of the bay is the entrance to Cox Strait,  $\frac{3}{4}$  mile wide, but contracted to less than 3 cables by a reef or bank which makes out to the **N NW.** from a point on the southern side of the entrance. The strait is less than 2 miles in length **E.** and **W.**, and varies from  $\frac{1}{2}$  mile to 1 mile in breadth; in the narrowest part the soundings range from 32 to 40 fathoms, over a hard bottom of sand and shells.

The tides run very strongly through the strait.

Cox Strait is separated into two arms by Lucy Island, which is somewhat less than  $\frac{3}{4}$  mile long and  $\frac{1}{4}$  mile broad.

The southern or main channel is more than  $\frac{1}{2}$  mile wide, with soundings of 30 fathoms, rocky bottom; the shores, except in the narrow western entrance, seem to be clear of danger.

The northern arm is not much over a cable wide and is obstructed by foul ground making off to the northward and eastward from the **E.** shore of Lucy Island less than  $\frac{1}{2}$  mile, and a similar bank from the opposite shore of North Island.

A small islet lies about a mile to the eastward of the eastern entrance to the southern arm, and a rock awash has been reported **NE.**  $2\frac{1}{4}$  miles from the same locality and about  $1\frac{1}{4}$  miles off North Island.

**SSE.** from Lucy Island a cove is indicated on the Graham Island shore called Bruin Bay, with anchorage in 10 or 12 fathoms,  $\frac{1}{4}$  mile from shore.

**Tides.**—In Cloak Bay it is high water, full and change, about 12<sup>h</sup> 20<sup>m</sup>; tides rise 10 to 16 feet. The flood tide comes from the westward and runs about 6 hours.

The best anchorage is in the middle of Cloak Bay in about 17 fathoms. With a westerly gale an anchorage may be found in Cox Strait; the holding ground is not good in either place.

**Henslung Cove**, on the **S.** side of North Island, is a snug but contracted cove in which whalers used occasionally to anchor. At the head of the cove is a sandy beach with a stream of water running through it. The anchorage is in about 30 fathoms.

There was formerly a considerable population in this vicinity, and several authors speak of the remarkable wooden carvings of great size, on the North Island shore, or attached to the winter dwellings of the natives.

From the eastern entrance to Cox Strait the trend of the shore is about **E.** to a small point, **N.** from which is a very remarkable columnar mass of sandstone and conglomerate rock; it is about 25 feet in diameter and 95 feet high; the summit is sloping and covered with small bushes; it is called **The Pillar**; it is separated at high water from the main shore, but rises from a sandy and stony flat at low water. An indentation of the coast between Bruin Bay and **The Pillar** is called **Pillar Bay**. **E.** from **The Pillar**  $5\frac{1}{4}$  miles is the mouth of Jalun River, with some visible rocks close to the shore on each side of it. This stream is of no great size, but its mouth at high water forms an excellent boat harbor. Five and one-half miles **E.** of Jalun River is Klaskwun Point, a rather remarkable promontory, which is backed by a rounded hill about 200 feet high and visible from a long distance; **N NE.** from this point and  $\frac{1}{2}$  mile off shore lies **Shag Rock**, moderately high. The Yatsa Indian village is near Klaskwun Point.

The coast is here fringed with rocks, mostly visible;  $2\frac{1}{2}$  miles **E.** of the Yatsa village are several rocks and islets off **Point Naden**, where the coast changes its trend to the **SE.** for about 4 miles to the entrance to Naden Harbor and forming the western shore of Virago Sound; the general direction of the sound is nearly **N.** and **S.**, funnel shaped, with its greatest width at the entrance; the shores are low and densely wooded.

From the head of Virago Sound a narrow passage leads into an interior basin called Naden Harbor. This capacious and land-locked harbor is about 4 miles in greatest length **N.** and **S.** and 2 miles in width, with depths of 8 to 12 fathoms in it. Low land densely wooded with spruce and hemlock of fine growth borders the whole harbor. Rock appears on the shore only near the bottom of the harbor, and at Kung Village in the narrows. The southeastern shore of the harbor is low, with wide tide flats; the northwestern shore is comparatively bold.

**Virago Sound**, constituting the entrance to Naden Harbor, is  $3\frac{1}{2}$  miles wide between its outer points, Capes Edensaw to the **E.** and Naden to the **W.**, and  $2\frac{1}{2}$  miles deep to the narrow passage, which is  $1\frac{1}{2}$  miles long, and about  $\frac{1}{2}$  mile wide, leading into the harbor.

The outer anchorage of Virago Sound is sheltered from all winds to the southward of **E.** and **W.** With two small islets on the **W.** side of the entrance bearing **W.**  $\frac{1}{2}$  **S.** 1 mile, the **E.** point **NE.**  $\frac{3}{4}$  **E.** 2 miles, and the opening to the inner harbor **S.**  $\frac{3}{4}$  **W.** about 2 miles, the depth is 5 fathoms water, sand and shells; the shores are low and fringed with kelp, but the lead will be a safe guide, as the water shoals gradually toward the land.

A vessel can always get an Indian pilot by firing a gun and anchoring for a short time.

The inner anchorage, opposite Kung Village on the western side, just within the narrows, is in 10 fathoms at about 2 or 3 cables off shore.

Above Kung Village a bank extends off the eastern side of the narrows nearly half way across, leaving a channel along the western shore, with 7 to 10 fathoms water in it.

**Cape Edensaw** is the eastern headland of Virago Sound; from here the general trend of the land is **NE.** by **E.** for about 4 miles, when it rounds off to the eastward and southward, everywhere low, rocky, covered with boulders. The water is shoal well off shore, and shows wide fields of kelp. The trees along the shore are not of great size and show occasional grassy spaces. The shores are bordered by several islets for about 3 miles to an opening known as **Masset Sound**.

**Masset Harbor** is about 8 miles to the eastward of Virago Sound; it should be approached with caution; the entrance is between a low point, with a ledge of rocks covered with kelp  $\frac{1}{2}$  mile off it, on the western side, and the point of a long spit partly dry (the surf usually breaking the whole length of it) on the eastern side, the passage between having an extensive bar, with soundings of 3 to 5 fathoms on it.

Just inside the bar, on the **S.** side of the eastern entrance point, is an Indian village, off the center of which there is an anchorage in 10 fathoms. The ebb tide runs very strong and the anchorage is not desirable.

The land in the vicinity of **Masset Harbor** is all low, no hills being visible; it is generally densely timbered with fine spruce trees.

**Masset Sound**, from its seaward entrance, extends about 19 miles in a southerly direction, when it expands into **Masset Inlet**. The sound is about 1 mile in average width and carries a general depth of 10 to 12 fathoms.

From the eastern point of entrance to **Masset Harbor**, the shore takes a broad sweep for about 22 miles to **Rose Point**. This point bears **E NE.** from the **N.** point of **North Island**, distant about 48 miles.

**Rose Point** is a remarkable low promontory, apparently formed by the meeting of the currents and waves from the southward and the westward around this corner of the island. The eastern part of **Rose Point**, near **Cape Fife**, does not differ from the low, wooded coast to the southward; there are said to be many lakes and swamps inland; farther northward, where the point is narrower and more exposed, it is clothed with small stunted woods, which, in turn, give place to rolling, grass-covered sand hills; beyond this the narrow gravelly point is covered, above high water, with heaps of drifting sand and great quantities of drift-wood piled promiscuously together. The apex of the point is a narrow, steep-sided, gravelly bank which extends for a long distance at low water.

A very dangerous spit, called **Rose Spit**, runs off **Rose Point** in a northeasterly direction to a reported distance of 5 miles, but its exact extent has not yet been ascertained; the point should, therefore, be given a wide berth, especially in dark or thick weather. It is considered a dangerous and treacherous point to round, except in fine, clear weather. It has been reported that ships could anchor under **Rose Point**, in a **SE.** gale, in from 5 to 8 fathoms, but no directions are given. The tidal current over the spit is about 2 knots.

**Hecate Strait** is clear of dangers, except **Margaret Rock**, having 13 feet on it, reported in 1792, by **Ingraham**; no information has since been made public regarding it.

The east coast of **Queen Charlotte Islands** was examined by **Captain Brundige** in 1879, and a report made, but it has not yet been made public.

From **Margaret Rock** to the entrance to **Skidegate Inlet** extends **Dogfish Bank**, but having not less than 8 fathoms, except near the rock. In the northern part of **Hecate Strait** the shore of **Queen Charlotte Islands** should not be approached nearer than 20 miles.

**N.  $\frac{1}{2}$  E.** 30 miles from **Rose Point** lies **Zayas Island**, one of the **Dundas** group; but little is known of this island.

According to the local navigators of the **Hudson Bay Company** there is a good wide channel between **North** and **Middle Dundas** islands, with 25 fathoms water clear through. In steaming out from **Port Simpson**, this passage is well open, but on the **B. A.** chart it is represented as filled with islets and rocks. They also report an anchorage on the **SW.** side of **Zayas Island**, but of that nothing definite has been obtained. These passages have not yet been fully surveyed.

**Cape Muzon** is the extreme southern point of **SE. Alaska**, and forms the northwestern headland to **Dixon Entrance**.

Its geographical position is—

Latitude .....	54° 40' 26" N.
Longitude .....	132° 40' 35" W.

It is on the extreme **SE.** of the broad southeastern point of **Dall Island**. Immediately to the westward of the cape the shore line rounds gradually, being broken by a group of islands, connected with the shore at low water, and indented to the westward of the islands by **Liscome Bay**, of which the western headland is **Point Cornwallis**.

**Landmark.**—To the westward of **Liscome Bay**, a peculiar, bare, reddish cone projects from the surface of a smooth, rotund hill, or mountain, near its summit on the face toward **Point Cornwallis**. This cone is about 500 or 600 feet high and about 450 feet in diameter at the base.

**Cape Muzon** is a high and somewhat precipitous bluff with a strip of lower land in front of it. It is bare of vegetation to an average height of 30 feet above high water, and what little vegetation appears above that is stunted and sparse in comparison with the adjacent inland shores.

Having sighted Cape Muzon, it is best to shape a course to pass inside the **Nuñez Rocks**, and if the weather is thick it is better to pass *close* to Point Nuñez, which is bold-to, and from whence a course may be laid toward any desired point to the eastward.

Sailing vessels should take advantage of winds and currents to work carefully in. The flood tide in Dixon Entrance runs strong to the **NE.** off Cape Muzon.

Passing Cape Muzon, Cordova Bay and the entrance to Kaighanee Strait are open to the northward, separated from each other by Long Island, moderately high, narrow, and heavily timbered. South Point, its southern extreme, is a thickly wooded, rocky point about 600 feet high; there are some reefs and rocks extending off the point, but at no great distance off shore.

**Cordova Bay** is a large, deep bay entering the **SE.** end of Prince of Wales Island; near its head it connects with Klevak Strait, leading to Bucarrelli Bay.

**Point Nuñez** is the most southerly point of Prince of Wales Island. It is the southern point of a small island, called Bean Island, which is about 1 mile in extent. Point Nuñez is 20 miles **NE.** by **E.  $\frac{1}{4}$  E.** from Cape Muzon.

**Bean Island** is not particularly marked; the mainland behind it is high with a bluff seaward face.

**Cape Chacon**, known locally as Musatchie Nose, lies  $2\frac{7}{8}$  miles **NE.  $\frac{1}{4}$  E.** from Point Nuñez. When approaching from the westward, Point Nuñez will appear as the most southern point, and before reaching Cape Chacon might be mistaken for that cape. From the eastward Cape Chacon appears as three wooded, cone-shaped hills; from these the land rises by a flat step into a mountain made conspicuous by standing out alone; from the westward it has much the same appearance, the three cone-shaped hills coming out in their order, the third one soon appearing flat and elongated. Westward from Cape Chacon the land is high and broken. Extending out  $\frac{1}{4}$  mile from the cape is a ledge that uncovers only at extreme low water.

**E.** of Cape Chacon opens Clarence Strait, a deep passage nearly 100 miles in length, and having on both its shores many deep inlets and passages.

#### DANGERS IN DIXON ENTRANCE.

**Nuñez Rocks.**—This reef is of considerable extent; it lies  $3\frac{1}{8}$  miles **SW.  $\frac{1}{4}$  W.** from Cape Chacon, and 1 mile **SSE.  $\frac{1}{2}$  E.** from Point Nuñez, as developed by the U. S. Coast Survey in 1885. The reef is  $\frac{3}{4}$  mile long **SE.** and **NW.**, and  $\frac{1}{4}$  mile wide; a portion of the reef is uncovered at about one-half tide, the balance showing, in summer, large masses of kelp. It is a serious danger in entering Dixon Entrance, and several vessels have been wrecked upon it in foggy and bad weather. The soundings show deep water close to the reef.

Very strong tides prevail in this vicinity, and great caution is necessary in its navigation. Several breakers have been reported in the vicinity of the Nuñez Rocks, but the Coast Survey steamer Patterson, working there in 1885, did not develop anything more than that the Nuñez Rocks are much more extensive than previously supposed.

In 1883 Captain James Carroll, of the steamship Idaho, reported a breaker about **SE.  $\frac{1}{4}$  E.**, 7 miles from Cape Chacon, which he supposed to be Chacon Breaker. This rock was searched for by Lieut. Clover in the Patterson in 1885, but not found, but it is quite possible that isolated pinnacle rocks exist.

**West Devil Rock.**—This is an exceedingly dangerous reef lying directly in the track of vessels bound into Dixon Entrance, as well as for vessels crossing from Clarence to Hecate Strait. It consists of a ledge extending **N.** and **S.**  $\frac{1}{2}$  mile, with a pinnacle at its **S.** end showing 5 feet at low water, and an occasional heavy break at its **N.** end. This reef lies **SW.  $\frac{1}{2}$  S.** from Barren Rock, distant 10 miles, and **SE.  $\frac{3}{4}$  E.** from Cape Chacon, distant  $14\frac{1}{2}$  miles. The depths over the ledge, clear of the pinnacle, were 6 to 35 fathoms, immediately dropping off into very deep water.

**McCullough Rock**, reported by Captain McCullough, of the Hudson Bay Company's steamer Otter, lies about **SW.  $\frac{1}{2}$  W.** from the **NW.** end of Zayas Island, distant about 3 miles; it is usually marked by a breaker.

**East Devil Rock.**—This reef, which bares at low tide, is of considerable extent; it lies about 4 miles **NW.** of Zayas Island. From the reef a peculiar saddle on Duke Point bears **NW.** But little is known of either of these two rocks.

The early charts noted a reef about 3 miles **SSW.** from Boat Harbor Point, near Cape Fox; a careful search in 1883 failed to show any indications of rocks, and no person could be found who had ever seen it.

The navigation into Revillagigedo Channel from Dixon Entrance is much impeded by the many rocks and reefs lying **S.** of Duke Island.

**Barren Rock** is the most southerly of these and is the key to the general navigation of Dixon Entrance; it is a bare rock about 20 feet above high water. It lies  $23\frac{1}{4}$  miles **NE.  $\frac{1}{4}$  E.** from Cape



## PORTLAND INLET.

Chacon and **SW.** by **W.**  $\frac{1}{8}$  **W.**  $17\frac{1}{4}$  miles from Cape Fox. Other small rocks show quite near to it at low water; the large masses of kelp in summer show that the surrounding reef is of considerable extent.

**West Rocks**, **W.** by **N.**  $\frac{1}{4}$  **N.**, 7 miles from Barren Rock, a group of three rocks covering a space of 1 mile, with others showing among them at low water and indications of outlying reefs.

**Hassler Reef**, probably identical with Brundige Rock, bares 10 feet at extreme low water; it is of considerable extent and is covered with kelp. It lies **W SW.**,  $\frac{1}{2}$  **S.** from Cape Northumberland and **S SE.**  $5\frac{3}{4}$  miles from Point Percy.

**Bee Rock**, bare, about 10 feet high and surrounded by kelp, lies **N.** by **E.**  $\frac{1}{2}$  **E.** 4 miles from Hassler Reef.

**Club Rocks**, two in number, bare, about 15 feet high and surrounded by reefs and kelp, lie **N. NW.**  $\frac{1}{2}$  **W.**  $4\frac{1}{4}$  miles from Barren Rock.

**Yellow Rocks**, two in number, one much smaller than the other, of a yellowish color, the larger rock showing some vegetation, lie **N NE.**  $\frac{1}{4}$  **E.** 5 miles from Barren Rock; they are about 20 feet above high water and are surrounded by kelp.

All of these rocks are more or less surrounded by reefs, showing kelp in summer.

About midway between Yellow Rocks and East Island is a reef marked in summer by kelp; it bares at low water.

Vessels should not go inside the line of Hassler Reef, West Rocks, Club Rocks, and East Island. There is deep water on either side of Yellow Rocks and Barren Rocks, but these waters should be navigated with caution and every appearance of kelp should be avoided, and it is also quite possible that isolated pinnacle rocks may exist that show no kelp.

## NAVIGATION OF DIXON ENTRANCE.

This entrance is trying to the navigator, both on account of the dangers to navigation and the bad weather that prevails here.

Vessels generally make Cape Muzon, and in case of a steamer, if bound to an Alaska port, shape the course so as to pass close to Point Nuñez, inside of Nuñez Rocks, which are covered at half tide; if the weather is thick it is better to pass close to Point Nuñez, which is bold-to, and from whence a course may be shaped for any desired point.

In good weather a vessel may round the **NW.** point of Queen Charlotte Islands at about 3 miles distance and stand across Dixon Entrance on a **NE.**  $\frac{1}{2}$  **N.** course directly for Cape Fox, from whence Port Simpson, Tongass, or Revillagigedo Channel may be made. This course passes between the West and East Devil Rocks, 3 miles from the former and 2 miles from the latter, and no other dangers are known, but there is always a measure of uncertainty in crossing where dangers are known to exist in the vicinity.

If bound to Port Simpson steer the **NE.**  $\frac{1}{2}$  **N.** course until the **NE.** point of Zayas Island bears **S. SE.**  $\frac{1}{2}$  **E.**, when the East Devil Rock will be passed, and from which point an **E.** by **N.** course heads directly into the harbor.

From the same point an **E NE.** course leads to the middle of the entrance to Portland Inlet.

## PORTLAND INLET.

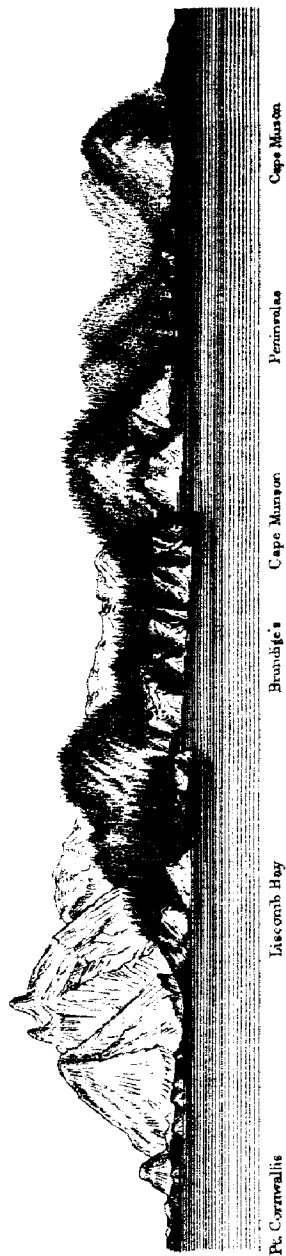
The mid-channel line of this great arm of the sea forms the boundary line between British Columbia and Alaska. It extends from the **NE.** part of Chatham Sound in a **N.** by **E.**  $\frac{1}{4}$  **E.** direction for 10 miles, thence **N.** by **E.** for 10 miles farther, where it divides; one arm, Observatory Inlet, continuing northward, and the other, Portland Canal, taking a northwesterly and northerly direction. At its southern entrance, between Wales and Maskelyne Islands, Portland Inlet is about 3 miles wide, and its shores are comparatively free from dangers beyond the distance of 2 cables.\*

**Wark Channel.**—On the British Columbia side, directly to the eastward of Point Maskelyne, the Wark Channel, a nearly straight arm, stretches 30 miles to the southeastward, its head reaching within 1 mile of Port Essington, and forming by the portion between this arm and Chatham Sound the Tsimpsean Peninsula.

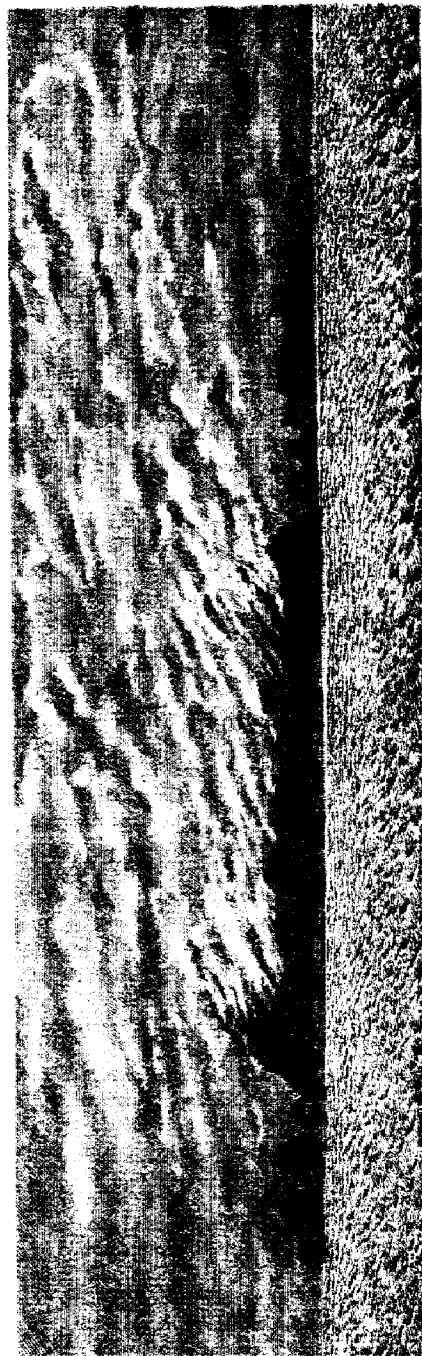
Within a distance of 15 miles from Point Maskelyne, on the eastern shore of the inlet, are three islands of considerable size, called, respectively, Compton, Truro, and Somerville islands, the largest and most northerly of these being the latter. It is separated from the mainland by a channel about 1 mile wide, called Steamer Passage, into which debouches an arm extending to the **S.** and **E.** some 12 miles. Steamer Passage has from 28 to 40 or more fathoms throughout its whole extent.

At the **N.** end of Somerville Island is a small bay called by the same name. It is about  $1\frac{1}{4}$  miles in length and varying in width from  $\frac{1}{2}$  mile to less than  $\frac{1}{4}$  mile. It is 20 miles distant from Port Simpson; the outer and wider portion is unsuitable as an anchorage on account of the great depth of water, which varies from 100 fathoms at the entrance to 30 fathoms at the beginning of the narrow neck near the head of the bay. The inner part forms an excellent anchorage, in 10 fathoms, for very small vessels; no particular directions are necessary.

\* See Vancouver Island Pilot—Supplement.



South end of Dall Id., S.E. Alaska., bearing (p.c.) N. 2 Miles



Kagahne Summit

Cape Munson W by N  $\frac{1}{2}$  N.  $\frac{1}{2}$  Miles.

(from a sketch by Geo. Davidson, Assist. U. S. G. & G. S. 1867.)

To the northward from the N. end of Somerville Island a branch called Nasoga Gulf extends to the northward for 5 miles, nearly parallel with the trend of the main inlet from which it is separated by the Mylor Peninsula, which is a high and comparatively narrow strip of land about  $9\frac{1}{2}$  miles long, with an average breadth of 2 miles. A small islet called Ranger Islet lies 3 cables off its S. extreme, and there the land is comparatively low, 450 feet, but it rises quickly to the height of 2,900 feet and forms high, bold, precipitous shores. About 1 mile from the N. extreme of the peninsula the land again begins to fall and terminates in Low Point, low and wooded, which forms the SW. entrance to Nass Bay.

Trefusis Point, the S. extreme of the peninsula, terminates in high white cliffs.

Nasoga Gulf is about 1 mile wide; at its head is comparatively high land. In the gulf there is no bottom at 39 fathoms, but anchorage may be found near its head in mid-channel 2 cables off shore in 10 to 12 fathoms, sandy bottom.

Separating Portland and Observatory inlets is a long and narrow peninsula, the southern extreme of which is called Point Ramsden; this point is bluff, high and wooded; a dangerous cluster of rocks, awash and sunken, extend a distance of 4 cables SE. of the point, with depths of 120 and 126 fathoms, mud, at 4 cables off the NE. and SE. sides.

To the eastward of Point Ramsden, across the entrance of Observatory Inlet about 3 miles, lies the entrance to Nass Bay, a small inlet with one branch to the southward and receiving from the NE. the Nass River. The mouth of this river is obstructed by a sand flat which dries at low water, and extends toward the mouth of Iceberg Bay, which is the SE. arm of Nass Bay.

Iceberg Bay is 3 miles long in a S SW. direction and not less than  $\frac{3}{4}$  mile wide. The head of the bay terminates in a low, swampy flat, fronted by a sand flat, and is 3 miles across from Nasoga Gulf; at the mouth of the bay the depth of 10 fathoms and less will be found, but as the head of the bay is approached the water deepens to over 40 fathoms.

Anchorage may be obtained at the mouth of Iceberg Bay in 7 to 8 fathoms, muddy bottom, with North Point in line with Double Island Point, bearing NW. by W.  $\frac{1}{4}$  W., distant 3 cables from the latter. In taking up this anchorage, having rounded Low Point at the distance of 3 cables, keep the S. shore of the bay on board; pass 1 cable to the northward of Double Islet Point and anchor as above.

North Point, the N. entrance point of Nass Bay, terminates in a bold cliff, and 1 mile eastward is Mission Valley, extending to the northward; on the western side of the valley, 1 mile back from the coast, is Mt. Tomlinson, 3,385 feet high and conspicuous; at the mouth of the valley is the mission station of Kincolith; it is fronted by a sand flat which renders communication by boat, except at high water, almost impossible. Fort Point, the NW. entrance point of Nass River, terminates in white cliffs. On the eastern side of the bay the Mud Islands, low and dark, will be seen. An extensive sand flat occupies nearly all the eastern portion of the bay at low water, and the entrance into Nass River is obstructed by a bar having but 9 feet at low water. The western portion of Nass Bay is deep, but as the N. shore is approached it shoals suddenly from 45 to 15 and then to 2 fathoms.

Anchorage in fine weather will be found off Kincolith, nearly in the middle of Nass Bay, in 10 fathoms, mud, about 8 cables from the N. shore, with the mission flagstaff bearing N. by E. and Leading Point (S. side of Nass River) just open of Fort Point NE. by E.  $\frac{1}{2}$  E.

On account of the strong ebb tide care must be used in approaching this anchorage.

It is high water, full and change, at Nass Bay at 1<sup>h</sup> 20<sup>m</sup>; springs rise 17 to 23 feet.

Mud Islands, about 4 cables apart, lie parallel to the eastern shore of the bay, 6 cables off shore; they are, respectively, 145 and 106 feet high.

Nass River flows into the NE. corner of the bay; the mouth of the river is obstructed by a sand flat, which dries at low water; the SW. extreme of this flat, called Ripple Tongue, lies N.  $2\frac{1}{2}$  cables from Double Island Point. Within the river the navigation is difficult and dangerous, and the channel at low water barely navigable for large canoes; at its entrance the river is  $1\frac{1}{2}$  miles wide. The head waters of the river approach very closely those of the Stikine.

Observatory Inlet.—This inlet, called by the Indians Kit-sah-watl, is, generally speaking, similar to the other inlets; in some parts, however, the shores are low and wooded, the land rising at a few miles back to from 4,000 to 5,000 feet. Abreast North Point, Observatory Inlet is  $1\frac{1}{4}$  miles wide and runs in a generally northerly direction for about 12 miles, thence N. by W. 4 miles, and widens to 3 miles abreast Salmon Cove, 10 miles above which the inlet divides into two arms, both terminating in low, wooded swamps, fronted by mud flats. The water in the inlet is deep; the anchorage in Salmon Cove is in 31 to 35 fathoms, mud and gravel. Above Salmon Cove are several islands, and several salmon fisheries have been established in that vicinity.

The strength of tide in Observatory Inlet depends a great deal upon the freshets caused by the melting snow. Abreast Nass Bay the ebb runs with great strength.

#### PORTLAND CANAL.

This inlet is about 60 miles in length and 1 mile wide. From its entrance at Point Ramsden, about 20 miles above Wales Point, the canal runs in a general NW. direction, terminating at its head in

Latitude	55° 55' 43" N.
Longitude	129° 59' 17" W.

in time 8<sup>h</sup> 39<sup>m</sup> 57<sup>s</sup>.2. It possesses the general characteristics of the other inlets on the coast of British Columbia, high land on both shores terminating in low, swampy land at the head of the inlet. The water is generally very deep, and the anchorages few and indifferent.

The boundary line between Alaska and British Columbia passes down the middle of the canal.

In places the mountains rise almost perpendicularly above high water to the height of 6,000 feet. Their summits are always snow clad and the melting snow produces waterfalls and avalanches. With the exception of a few wooded valleys at the mouths of streams the snow line is often very low, even at midsummer.

The head of Portland Canal terminates in the usual low, woody, swampy land, with one or more rivers flowing through it.

The two rivers, Bear and Salmon, at the head of the canal, are separated by a ridge of bare mountains about 2,500 feet high. It is reported by the Indians of the vicinity that the two valleys are joined about 15 or 20 miles back and form one large valley.

On the **E.** side of the valley of Bear River a mountain range extends in an **E.** and **W.** direction; Mount Disraeli, the highest peak of the range, is a snow-clad pinnacle 7,000 feet high.

Tree Point, on the western shore of the canal about 3 miles from its entrance, is the **N.** point of Pearse Island, which is separated from the mainland by a narrow channel called Pearse Canal. It is a double point, low, wooded, and conspicuous, with high land at about 1 mile **S.** of it. A reef of considerable extent lies in a northerly direction about  $\frac{1}{4}$  mile off each point; both are nearly steep-to. The small bight between the two points is called **Whiskey Bay**; it affords boat anchorage only.

Across Portland Canal nearly **N.** from Tree Point is Dogfish Bay, about  $\frac{1}{2}$  mile wide and less than  $\frac{1}{4}$  mile deep, and facing to the **SW.** This bay, being occupied by a sand flat at low water, is useless as an anchorage. A small islet called Windy Islet lies close to the shore near the **N.** entrance to Dogfish Bay.

Noble Point lies on the eastern shore 6 miles above Point Ramsden; between this point and Dogfish Bay several small wooded islets lie close to the eastern shore and are connected with it at low water.

A sand spit which uncovers at low water extends 3 cables **SW.** from Noble Point.

Reef Island is a small island lying on the western shore abreast Noble Point; two small bays with sandy beaches lie under Reef Island, and in which there is boat anchorage only. A reef with rocks awash at high water and sunken rocks extends 2 cables **SE.** from Reef Island.

From mid-channel between Reef Island and Noble Point the canal runs **N.** for 13 miles, with an average width of 1 mile. The eastern shore of this reach is bold and unbroken, but on the western shore lie two small bays, neither of which affords anchorage.

Harrison Point is a high bold point on the western shore, 2 $\frac{1}{2}$  miles **N.** from Reef Point.

Dickens Point is on the eastern shore 4 $\frac{1}{2}$  miles from Noble Point, with a considerable curve to the eastward in the coast between them. A small black rock 8 feet above high water lies close **S.** of Dickens Point, and a ledge of rocks which uncover extends 2 cables from the point.

Sandfly Bay, on the western shore abreast Dickens Point, is  $\frac{1}{2}$  mile wide, and about the same depth in a **NW.** direction, terminating in a swamp with streams in the **NW.** and **NE.** corners; at the **N.** point of the bay two small islets lie close to shore. The bay itself is nearly occupied by a sand flat at low water and is therefore useless as an anchorage.

Stopford Point is bold and conspicuous, and lies on the eastern shore 3 miles from Dickens Point.

Halibut Bay, on the western shore 4 miles from Sandfly Bay, is about 1 $\frac{1}{2}$  miles in length **NW.** by **W.** and  $\frac{1}{2}$  mile in width at the entrance, narrowing to half that distance. The anchorage is in 6 to 10 fathoms, well in toward the narrowest part of the cove, abreast an Indian house; the holding ground inside the 10-fathom curve is good, but the anchorage is quite contracted and only suitable for quite small vessels. The bay is exposed at the entrance to the strong southerly winds that sweep up the canal, making with the ebb tide a disagreeable chop sea.

The shores of Halibut Bay are generally very bold, but on each side near the entrance are small sandy beaches about  $\frac{1}{4}$  mile in length. The bay is entirely free from hidden dangers and outlying rocks or reefs. Near the head of the bay extensive flats bare at low water make out from the northern shore, extending nearly all the way across, having a narrow channel on the eastern side which is very bold and where from 4 to 6 fathoms water can be carried, leading into a shallow basin inside the flats. The head of the bay narrows to less than  $\frac{1}{4}$  mile and consists of flats quite  $\frac{1}{2}$  mile in length, back of which the land is low and marshy for nearly 1 mile. On the western edge of the flats a narrow stream follows closely the shore line, leading up to a waterfall nearly 300 feet in height. A rocky point about 20 feet high above high water and  $\frac{1}{4}$  mile to the northward of the right entrance was determined to be in

Latitude .....	55° 13' 13" N.
Longitude .....	130° 04' 30" W.

in time 8<sup>h</sup> 40<sup>m</sup> 18<sup>s</sup>.00. Variation 27° 44' 38" **E.** in 1888.

Cross Islet, a small wooded islet connected at low water with the shore, lies close northward of Halibut Bay.

**Logan Point** lies on the eastern shore  $4\frac{1}{2}$  miles from Stopford Point. A conspicuous saddle-shaped mountain 4,800 feet high lies 3 miles **SE.** from Logan Point.

**Camp Point** lies on the western shore and is the turning point of the northern reach, which abreast of that point changes from **N.** to **N NW.** The point is wooded, bold, and precipitous.

**Hattie Island**, situated exactly in mid-channel abreast Camp Point, is 400 yards long **N.** and **S.**, with some stunted brush growing on it. It is exactly on the boundary line between Alaska and British Columbia.

A ledge of rocks awash, and sunken rocks, extends 2 cables northward from Hattie Island. The water is deep on either side of the island beyond the distance of 2 cables from it. The channel on the western side is recommended.

**Barclay Valley** lies on the eastern shore abreast Hattie Island; a large stream flows through the valley; the mouth of this valley, called Belle Bay, does not afford an anchorage. The neck of land separating Portland Canal and Observatory Inlet is here about 4 miles wide.

**Landslip Point** lies on the eastern shore 3 miles northward of Hattie Island. Three conspicuous landslides are seen on the mountains **S.** of Landslip Point.

**Bluff Point**, terminating in a high bold bluff, lies on the eastern shore 3 miles above Landslip Point.

**Breezy Point**, on the western shore 5 miles from Camp Point, is conspicuous. The land recedes between these two points.

**Tombstone Bay**, a broad, shallow bight, lies on the western shore 3 miles **NW.** by **N.** from Breezy Point. An extensive well-wooded valley lies at the head of the southern part of the bay, and on the **N.** side of the valley a remarkable mountain, with a dome-shaped snow-clad summit, rises to the height of 6,500 feet. Trout are plentiful in the river flowing into this bay. This bay does not afford an anchorage, except to small vessels.

**Maple Point** lies on the eastern shore about 3 miles above Bluff Point; maple trees grow upon this point, and when in leaf render it conspicuous. Immediately southward of Maple Point is a bay with a large stream flowing into it, fronted by a sand flat; the bay affords a fair anchorage for small craft.

**Swamp Point**, a low, marshy, wooded point through which a river flows, lies **NW.**  $\frac{1}{2}$  **W.** 3 miles above Maple Point. A sand spit extends 5 cables **S.** from this point. Above Swamp Point the canal takes a general direction of **NW.**  $\frac{1}{2}$  **W.** to abreast of White Point.

**Pirie Point**, situated **NW.** by **W.** 2 miles from Swamp Point, is high, bold, and conspicuous. A sand spit extends out 2 cables from the eastern shore midway between Swamp and Pirie points.

**White Point** lies on the eastern shore 4 miles above Pirie Point; from this point the canal takes a general direction of **N NW.**  $\frac{1}{2}$  **W.** to Blue Point.

**Turn Point** lies on the western shore  $1\frac{1}{2}$  miles from Tombstone Bay; this point is high, bold, and conspicuous.

**Steep Point**, on western shore about 6 miles from Turn Point, is bold and steep-to; two large and numerous small streams flow into the canal midway between these points.

**Foggy Point** lies on the western shore about 6 miles **NW.**  $\frac{1}{2}$  **W.** from Steep Point. The coast between these points recedes considerably to the westward in a deep curve. At  $2\frac{1}{2}$  miles southward of Foggy Point an extensive valley lies in a southerly direction between mountains from 3,500 to 4,000 feet high; the valley is thickly wooded, and through it a large stream flows.

**Bay Islet** lies on the eastern shore abreast of Foggy Point; this islet is small and wooded, and lies 1 cable off a point which divides two sandy bays; the islet is connected with the point at low water.

**Green Islets** are two small wooded islets on the eastern shore, distant  $1\frac{1}{2}$  miles from Bay Islet; close northward of these islets there is a considerable tract of comparatively low land thickly wooded, and through which a large stream flows.

**Fords Cove**, on the eastern shore just **N.** of Green Islets, is formed by a decided bight in the shore line, with excellent shelter from the southward but none from northerly winds. A fair anchorage may be obtained in 20 fathoms, with sufficient swinging room; vessels anchoring close-in will need to carry stern moorings ashore. Green Islets are such only at high water, being connected with the mainland by a short, narrow spit which uncovers about 4 feet above low water. To the northward of the islets a rocky ledge extends about 100 yards, showing at low water. In approaching the cove from the southward give Green Islets a fair berth of several hundred yards. On the western shore, opposite Fords Cove, are mountain glaciers of considerable extent.

**Slab Point** terminates in a high, smooth, slate-colored cliff, and lies on the western shore 2 miles from Foggy Point.

**Blue Point** lies on the eastern shore  $4\frac{1}{2}$  miles from Green Islets; it terminates in high, bold cliffs, of purple blue color, and basaltic formation; close **S.** of the point an extensive wooded valley extends to the northeastward; two large streams flow through the valley, and a sand spit extends off their mouths to the distance of 2 cables.

**Cliff Point**, on the western shore, terminates in high, white cliffs and is steep-to.

## PORTLAND CANAL, BEAR RIVER.

**Verdure Point**, on the western shore, lies NW. by N. 4 miles from **Cliff Point**; the maple trees growing on this point when in leaf render it conspicuous. Midway between **Cliff** and **Verdure** points there is an extensive wooded valley through which a large stream flows; it is fronted by a broad, deep point which does not afford an anchorage. Close northward of **Verdure Point** is a bay with a conspicuous sandy beach at its head; it does not afford an anchorage.

With the exception of a small bay that dries throughout at low water, the eastern shore northward of **Blue Point** is high, bold, and almost inaccessible.

**Seal Rocks**, on the western shore, are of small extent and lie 2 cables off shore; the highest rock is 6 feet above high water. About 1 mile to the southward of the **Seal Rocks** an extensive wooded valley takes a westerly direction between high mountains, and a large stream flows through it.

**Marmot River**, on the eastern shore,  $2\frac{1}{2}$  miles from the mouth of **Bear River**, flows through an extensive valley which lies in an easterly direction; a sand spit extends 3 cables off the mouth of the river and is steep-to. At the head of the valley a mountain range with three conspicuous peaks called **Treble Mountain**, 4,000 to 5,000 feet high, lies in a NW. and SE. direction.

**Salmon River** lies on the western shore  $1\frac{1}{2}$  miles below **Bear River**, and is separated from that river by a range of bare mountains 4,000 to 5,000 feet high, called the **Reverdy Johnson Mountains**. The river is a stream of considerable size, and the valley through which it flows is  $\frac{1}{2}$  mile wide at its mouth, widening to 1 and 2 miles, and is flanked by high mountains. Extensive flats make out in a fan shape from the mouth of **Salmon River**, the northern portion of which extends quite halfway across the canal; these flats are entirely covered at ordinary high water and are very steep-to; 20 fathoms can be carried to within a ship's length of the flat.

**Lion Point**, on the eastern shore of the canal, 3 miles below its head, marks the beginning of a narrow valley which runs back between the high, surrounding mountains about 2 miles. A very considerable bight makes into the shore just S. of **Lion Point**, but it is filled up by flats which are bare at extreme low water. A good-sized stream empties upon the flats.

In approaching the head of the canal after passing **Lion Point**, the eastern shore should be followed closely, as it is very bold.

**Bear River** flows through an extensive wooded flat at the head of **Portland Canal**. At about 1 mile back from the tide-water ledge of the flats it divides into several branches, of which the two larger and deeper follow close to the foot of the mountains on each side of the valley. These two main branches at present make a large river island out of the whole valley. The larger of the two channels is on the eastern side and spreads out to a considerable width toward the center, and 1 mile farther on again opens out to nearly the whole width of the valley, then contracts again and deepens, following the foot of the mountains on the western side. These channels are evidently subject to changes during freshets when the river is carrying its largest volume of water.

The **Salmon River** valley is not so extensive as that of the **Bear River**. The high portions of both valleys are covered with a thick growth of cottonwood, and are divided into large and small islets by the numerous shallow channels.

Anchorage may be obtained in 25 to 30 fathoms, soft mud, about  $\frac{1}{8}$  mile below the **Bear River** flats on the eastern side; the holding ground is good, but the anchorage is thoroughly unprotected, being exposed to the southerly winds coming up the canal, and the northerly winds that sweep down the **Bear River** valley.

Tides were not observed at the head of the canal, but at **Fords Cove** it is high water, full and change, at 0<sup>h</sup> 29<sup>m</sup>, with a mean rise and fall of 13 feet, and 21 feet at extreme high water. The same results were obtained at **Halibut Bay**.

The **Astronomical Station** at the head of **Portland Canal**, on the **Bear River** flats, was determined to be

Latitude .....	55° 55' 43" N.
Longitude .....	129° 59' 17" W.

in time 8<sup>h</sup> 39<sup>m</sup> 57.2 W.

Declination 30° 09' 28" E. in 1888.

The depth of water in **Portland Canal**, from its mouth to its head, is quite irregular; from its entrance to **Swamp Point**, a distance of 32 miles, the depths vary from 100 to 185 fathoms; then the shoalest part of the canal is found, with from 50 to 90 fathoms for a distance of  $2\frac{1}{2}$  miles, after which the water deepens again, varying from 110 to 170 fathoms to **Cliff Point**, a distance of 12 miles above the shoalest part; above **Cliff Point** exists a deep hole, 4 miles in length, where the depth is 210 fathoms, after which 180 to 110 fathoms is carried up to the mouth of the **Salmon River**.

Both shores of **Portland Canal** are very bold, except as noted, with mountains on each side. At the head of the canal the water is nearly fresh. Large and small streams empty into the canal at nearly every mile. Both **Portland Inlet** and **Portland Canal** are free from all hidden dangers, and the navigation of these waters is perfectly simple by keeping an ordinary distance from the shore line. The numerous outlying islands and detached rocks are close in shore and are all well indicated on the chart.

During the winter months the north winds, drawing down **Portland Canal** and **Observatory Inlet**, blow with great violence through **Portland Inlet** and across the upper part of **Chatham Sound**,

rendering the navigation dangerous at times for small vessels. These winds often spring up with great suddenness and little warning.

CAPE FOX TO PORTLAND CANAL.

The small island forming the southernmost point of the Peninsula Ridge has been named Cape Fox, and is in

Latitude .....	54° 45' 46" N.
Longitude .....	130° 50' 20" W.

It is about 30 feet high, wooded, and with a larger island and some smaller ones, all wooded, between it and the mainland.

**Harry Saddle**, 2,086 feet high, is situated  $2\frac{1}{2}$  miles N. by W.  $\frac{1}{2}$  W. from Cape Fox.

From the cape to the eastward the shores are generally steep, with ledges extending a short distance off shore.

**Boat Rock**, bare, about 5 feet above high water, lies 2 miles NNE.  $\frac{3}{4}$  E. from Cape Fox, and 200 yards off shore; it has kelp outside of and near to it.

**Slim Island**, about  $1\frac{1}{2}$  miles N. of Boat Rock, is high, steep, and wooded; to the westward of it is a reef extending off from the mainland about 250 yards, covered at high water, and marked by a small quantity of kelp. The deep bight northward of Slim Island does not afford shelter nor anchorage.

**Ledge Point** lies  $\frac{3}{4}$  mile N. by E. from Slim Island; at nearly  $\frac{1}{4}$  mile S. from the point are two detached rocks, showing at low water, and marked by small quantities of kelp; to the SE. from the point a ledge makes out nearly  $\frac{1}{4}$  mile, portions of which are awash at high water; there is a small quantity of kelp at its outer end.

**Nakat Inlet**, the NW. headland of which is Ledge Point, extends in a NNW. direction about 8 miles; its shores at the entrance are steep and high, and timbered to the water's edge; it affords no anchorage; at its upper end are some wooded islands, and a chain of wooded islets separate it from an inner arm, in the southern part of which anchorage and shelter may be found for moderate sized vessels in 18 fathoms, off a small bight having a gravel beach, and about halfway up the arm; there is also anchorage in the northern part, but the shelter is not as good. These anchorages are indifferent and no particular directions are given.

**Observation Rock**, lying in the middle of the inner arm, is grass covered, and about 6 feet above high water; it is about 40 yards long N. and S., and 15 yards in width; the navigable channel is on its western side.

**Tongass Island** lies  $3\frac{1}{2}$  miles NE.  $\frac{3}{4}$  E. from Cape Fox; it is of irregular shape, and about  $\frac{1}{2}$  mile square. On its northern side, on a natural terrace facing N., are the buildings used as barracks during its occupation by the U. S. troops. A custom house was formerly located here but was abolished in 1889. On the southern side of the island is a large Indian village; the central part of the island is somewhat swampy. S. and W. of the island are many ledges and sunken rocks, most of them marked by kelp, and on which the sea breaks in heavy weather; ledges extend well out from high-water mark, entirely around the island except on its NE. side. In front of the barracks is a small sand beach, and close outside of that a ledge partly showing at low water and marked by kelp.

To the NW. of Tongass Island and in line with its northeastern side are three dangerous patches of rocks extending in a northwesterly direction.

**Tongass Reef**, the northwesternmost of these rocky patches, lies about  $\frac{1}{16}$  mile from the N. point of the island; it is about 300 yards long N. and S., 80 yards wide at its N. end, and 250 yards wide at its S. end, and is nearly awash at extreme high water; it shows kelp close around its edges and toward Passage Rock, which lies  $\frac{1}{4}$  mile distant SSE.; this latter reef is about 60 yards long N. and S., by about 40 yards wide; it covers at high water and shows kelp all around. With local knowledge there is a safe passage between these two reefs.

**Track Rock** lies about midway between Passage Rock and the N. end of Tongass Island; it is about 50 yards long by 30 yards wide; it covers at high water, and shows kelp on its E. side, and between it and Passage Rock.

The channel between these rocks and the main shore, to the eastward, is about 2 cables in width.

**Craig Rock**, lying SW. by W. 1 mile from the N. point of Tongass Island, is a dangerous rock, having 9 feet over it at mean low water; it is a small double pinnacle, shows very little kelp, and usually breaks only in heavy SE. weather. It has deep water close-to.\*

**Port Tongass** is a small harbor about 2 cables in width, formed by the passage between Tongass Island and the mainland. It affords anchorage in 19 fathoms, hard bottom. It may be entered by three different channels.

**1. The Northern or main Entrance.**—Directions.—From the northward or westward, pass Cape Fox at a distance of about  $\frac{1}{4}$  mile; follow the coast line at a little greater distance off shore, heading for the entrance to Nakat Inlet, until up with Boat Rock, bearing

\*The body of water between Cape Fox and Tongass is sometimes called Nakat Inlet, but that name really applies only to the inlet proper, previously described.

## TONGASS PASSAGE.

about **SW.**; then steer **NNE.  $\frac{1}{2}$  E.** for the shallow bight above High Point until the barrack buildings begin to open out from Fort Point, when haul around gradually to the **SE.** Tongass Reef can be seen at all times; keep a little to the eastward of mid-channel, between it and the mainland, and anchor in 19 to 20 fathoms, with the flagstaff on Tongass Point, near the barracks, bearing **SSE.**, and Fort Point, the **N.** point of the island, bearing **W.  $\frac{1}{4}$  N.**

**2.** The passage **S.** of Tongass Island.—**Directions.**—Vessels from the southward or westward may enter through this passage, but the turn off the Indian village is sharp, and the channel is narrow and has many reefs. It is not recommended without good local knowledge.

**3.** Tongass Passage.—**Directions.**—From the southward the harbor may be entered through Tongass Passage, between Sitklan and Wales islands. Pass close to Haystack Island on its western side, thence a mid-channel course through the passage to the anchorage given above.

The harbor of Port Tongass is not suitable for large vessels.

At the anchorage the flood tide runs to the northward; **SE.** gales sometimes blow very hard, and it is possible that a vessel might drag her anchor, in which case secure anchorage may be found about 4 miles to the westward in Wales Harbor, on the **NW.** side of Wales Island.

**SE.** of Tongass Island, and separated from it and from the mainland by Tongass Passage, are Kannaghunut and Sitklan islands; they are high, with steep, rocky shores, and separated from each other by Lincoln Passage, which is narrow and nearly closed by a rock with 12 feet over it and marked by kelp. There is a ledge of garnet-bearing rock in Lincoln Passage on Kannaghunut Island.

Off Island Point, the **SE.** extreme of Sitklan Island, is a small islet, close in shore, with a small outlying reef.

Dark Point is the extreme southerly point of the peninsula between Nakat Inlet and Willard Inlet; it is the turning point from Tongass Passage into Tongass Harbor. It is steep, rocky, and heavily timbered. Off Dark Point, close to shore, is a bare rock about 15 feet above high water and having deep water close-to. Between Dark Point and High Point the shore line is steep with deep water close-to; **N.** of High Point the shores are steep, and near this point, to the northward, is a shallow, double bight, one arm of which connects at high water with Nakat Inlet.

Tongass Passage is a deep, narrow passage with very steep and wooded shores; through this passage, by Haystack Island, named from its shape, is the direction to Port Simpson.

At the **S.** end of Lincoln Passage is a broad, open bight in which vessels have anchored in 18 to 25 fathoms. It is not recommended for other than temporary use. It is usually known as Tlekhonsiti Harbor.

At the southeastern entrance to Tongass Passage are two groups of wooded islets and bare rocks, lying along the **SW.** shore of Wales Island, and called, respectively, the Proctor and the Boston islands; the westernmost of the Proctor group is Haystack Island, which is 450 feet high.

The channel is on its western side. In these groups are some sunken rocks and rocks awash, and the **SW.** shore of Wales Island should not be approached within  $1\frac{1}{2}$  miles.

Haystack Island is in

Latitude.....	54° 43' 02" N.
Longitude.....	130° 36' 32" W.

Wales Island forms the **NW.** side of the entrance to Portland Inlet. The northeastern shore is bold, with some conspicuous cliffs, of a red-brown color, about midway between the **N.** and **S.** extremes of the island. The island is about 7 miles long **E.** and **W.** Wales Point, on the **SE.** extreme of the island, is  $3\frac{1}{2}$  miles **WSW.  $\frac{1}{2}$  W.** from the **SW.** extreme of Somerville Island, on the opposite side of Portland Inlet. About 1 mile to the westward of Wales Point is a deep bay facing to the southeastward; within it are some patches that uncover and some rocks awash. A wooded island called Tracy Island, about  $\frac{1}{2}$  mile in length **NW.** and **SE.**, lies at the mouth of this bay and is  $1\frac{1}{8}$  miles **SW.  $\frac{1}{2}$  W.** from Wales Point.

Entry Peak lies about  $\frac{1}{2}$  mile **NW.** of Wales Point; it is 1,400 feet high, of triangular shape, with a sharp conspicuous summit.

The deep bay inside of Tracy Island does not afford an anchorage, as the water is too deep and the protection too limited.

Pearse Island lies to the northeastward of Wales Island and is separated from it by the narrow Wales Passage, and from the mainland by Pearse Canal. This island is about  $17\frac{1}{2}$  miles in length **N.** and **S.**, terminating to the northward in Tree Point, 3 miles inside the mouth of Portland Canal. Its shores on the eastern or Portland Inlet side are generally steep and bold; the three prominent bights on this side, near Rose Point, Pirate Point, and Lizard Point, do not afford anchorage; only small boats can find a shelter from northerly winds.

Fillmore Island lies **NW.** of Wales Island between it and the mainland, and is separated from Wales Island by Pearse Canal.

Pearse Canal, from Tongass Passage to Wales Passage, is filled with numerous islets and a great number of rocks sunken and awash at varying distances from the main shore line on each side; some of



the islets are wooded, some covered only with brush, and some quite bare; great care was taken during the survey in locating these dangers, but ordinary prudence would forbid its navigation, except with good local knowledge. The tidal currents are strong, and there may still be dangers not located. The flood tide runs to the NE.

From Wales Passage to Portland Canal Pearse Canal is without dangers and clear to navigation.

**Wales Passage**, though narrow, is completely free from hidden dangers; at its southeastern entrance in about mid-channel is a small island called Center Island, with a clear passage on each side; it is thickly wooded, with bold shores. Pearse Canal should only be entered through Wales Passage or from Portland Canal.

**Fillmore Inlet** separates Fillmore Island from the mainland; it extends about 2 miles to the northward beyond the island; the narrow entrance beyond the group of islets at the head of this inlet leads into two basins in succession, each of considerable size. The inlet is comparatively free to navigation, all outlying dangers being close in shore.

**Edward Passage** separates Fillmore Island from the mainland to the northward, and connects Fillmore Inlet with Pearse Canal. This passage is narrow, very foul, and not navigable.

**Hidden Inlet**, a narrow arm of 5 miles in length, extends into the mainland in a N NW. direction from Pearse Canal about 8 miles below its junction with Portland Canal. The entrance to this inlet is less than 150 yards in width, and through it the tides rush with a velocity of 10 to 12 miles an hour, forming swirls that extend clear across Pearse Canal. The main body of the inlet is about  $3\frac{1}{2}$  miles long, varying in depth from 30 to 70 fathoms, but only 5 fathoms at the entrance. It can only be entered at slack water, and is of no value as an anchorage.

About 2 miles northward of Tongass Passage, at the junction of Fillmore Inlet with Pearse Canal, is a narrow inlet extending into the mainland about 12 miles in a general NW. direction called **Willard Inlet**. It is very narrow at the entrance, and the tides run with great velocity, forming swirls that extend well out from its mouth. A small group of islands lie to the southward of the entrance. During the survey it was noted that the times of high and low water in this inlet were about 1 hour later than at other places in the vicinity, and the rise and fall was about 2 feet less. This inlet can only be entered at slack water, and has no value as an anchorage.

Leading off from Pearse Canal are two fine harbors, Winter Harbor, near the S. end of Pearse Island, and Wales Harbor on the W. end of Wales Island.

The entrance to **Winter Harbor** is about 1 mile NE. of Wales Passage; the harbor is a long, narrow inlet running parallel with Wales Passage. It is thoroughly protected and affords a very safe though somewhat limited anchorage; it is free from hidden dangers and has good holding-ground, with ample swinging room in the wider part.

The inlet is 4 miles in length, and about  $\frac{1}{3}$  mile in width at its widest part; for  $1\frac{1}{4}$  miles from the entrance the inlet is not over  $\frac{1}{4}$  mile wide; at this distance a broad bight makes into the southern shore, which, however, is filled by a small wooded islet and numerous rocks, with flats connecting the islet with the shore, thus continuing the channel at its former width of  $\frac{1}{4}$  mile for  $\frac{1}{4}$  mile further, when the inlet widens out and affords an anchorage  $\frac{1}{2}$  mile long and  $\frac{1}{3}$  mile wide in 6 fathoms, muddy bottom. The northern shore is bold, carrying from 4 to 10 fathoms up to the shore line, except a sand spit making out about 75 yards from a slight indentation, with low and grassy land, at the mouth of a small stream; also at the entrance to the anchorage ground will be found another low and grassy spot with limited flats at the mouth of a large stream which heads in a good-sized lake about 2 miles back and elevated about 250 feet. The head of the inlet contracts somewhat and ends in a broad flat, bare at low water.

#### DIRECTIONS FOR WINTER HARBOR.

In entering this harbor a vessel should keep the northern shore aboard in passing the bight previously described to avoid a rock awash at ordinary high water, lying about 75 yards off the islet.

**Tides.**—It is high water, full and change, at Winter Harbor at 0<sup>h</sup> 15<sup>m</sup>, with a mean rise and fall of 13 feet, the extreme rise and fall being 21 feet.

**Wales Harbor** is about 1 mile NE. of Tongass Passage; it affords a good anchorage in 15 to 20 fathoms, being well protected to the northward by the Safe Islands, off its entrance; this group of small islands, most of them wooded, and numerous detached barren rocks, form a natural breakwater to the harbor. This harbor is most conveniently situated for vessels unable from the weather or other causes to remain at anchor in Port Tongass. At the head of the harbor are three arms, the middle and largest one opening out into a basin about  $\frac{1}{2}$  mile in diameter. At the bottom of the harbor and nearly closing the western and middle arms is a good-sized island and a very small one close to the SE. of it. The usual anchorage is at the entrance to the eastern arm in 15 to 18 fathoms, soft bottom.

#### DIRECTIONS FOR WALES HARBOR.

Enter from Tongass Passage, and a mid-channel course, W. of the Safe Islands, leads directly to the anchorage. In entering the harbor the middle arm is masked by a good-sized island. The basin at the head of the middle arm may be reached by passing to the westward of the island and through the very narrow arm, in which there is not less than  $7\frac{1}{4}$  fathoms.

**Tides.**—It is high water, full and change, at Winter Harbor at 0<sup>h</sup> 15<sup>m</sup>, with a mean rise and fall of about 13 feet.

**Lord Islands**, lying about 2½ miles **SE.** by **E.** from Cape Fox, are in two groups, separated about ¾ mile, and having a number of islands in each group, the larger islands being wooded. There are sunken rocks and kelp close around these islands, with a clear channel between the groups. The channel **E.** of these islands is deep and clear of obstructions, except Craig Rock previously described.

There are several bare rocks about the Lord Islands.

**Lord Rock**, bare, about 10 feet above high water, is about 60 yards square. It lies **SE.** by **E.**, 2½ miles from Cape Fox, and ½ mile **SW.** by **S.** from the south group of the Lord Islands.\*

**Fleece Rock**, bare, about 12 feet above high water, about 100 yards long by 60 yards wide, lies about ⅓ mile **SSE.** of the southern group of islands.

**Thistle Rock**, bare about 10 feet above high water, about 100 yards long by 50 yards wide, lies about ⅓ mile **W.** of the northern group.

These rocks are all steep-to.

#### NAVIGATION NORTHWARD FROM DIXON ENTRANCE.

The shore line of the southern end of Dall Island is very broken, steep, and rocky. From its exposure to the sea it is made bare of vegetation to an average height of 30 feet above high water.

The extreme southeastern point of the **S.** side of Dall Island is Cape Muzon, in

Latitude .....	54° 40' 00'' N.
Longitude .....	132° 40' 35'' W.

The western point of the **S.** side is Point Cornwallis, Liscome Bay lying between the two points.

One mile **N.** of Cape Muzon, on the **E.** face of Dall Island, is an Indian village; in front of the village is a shelving beach and a group of three small islands; between the beach and the southern island is a boat passage at high water. The tidal current always sets from **N.** to **S.** through this passage, both at flood and ebb tide.

To the northward of the village is a wide bay having 11 fathoms, rocky bottom, in about the middle; the approaches are free from danger; a heavy ground swell sets in with a **NE.** wind, and it does not appear to afford an anchorage.

Between this and another, immediately adjacent to the northward, is a narrow peninsula, or high water island. At the head of this adjacent bay is a large stream abounding with salmon.

**Liscome Bay** is a shallow but wide indentation lying between Point Cornwallis and Cape Muzon. A stream comes down the valley at its head; the bay is open to the southward and is not known to afford an anchorage.

**Kaighanee Harbors.**—Four miles **NNW.** ½ **W.** from Cape Muzon is the South Point of Long Island. **WSW.** from this point, and on Dall Island, are the Kaighanee Harbors, first surveyed by Etolin in 1833.

From the U. S. Coast Survey examination of 1885, they appear to consist of two narrow indentations and a broad open bay lying to the **NW.** of them. No details are given in this latter survey, which differs materially from that by Etolin.

Between the southern of the Kaighanee Harbors and the broad open bay lying **NW.** of Cape Muzon, a narrow, compact chain of islands extends, lying about ½ mile off shore.

The southern harbor has a small islet, lying close to shore, at its **S.** entrance point; this harbor is about ½ mile deep in a **WSW.** direction and less than ¼ mile wide.

The middle harbor, lying about ½ mile farther to the **NW.**, is about ½ mile long, expanding somewhat from a narrow entrance of less than ¼ mile in width.

The northern Kaighanee, separated from the middle harbor by a narrow rocky tongue of land, is about ½ mile long, and about the same in width at its mouth, narrowing rapidly to its head.

In a small cove on the **S.** side of the middle harbor a small vessel may find an anchorage in about 5 fathoms.

All the harbors are open to the swell and winds from the **SE.**, and offer no particular advantages to the navigation of that locality.

**South Point**, on Long Island, is a thickly wooded, rocky point, about 600 feet high. **NE.** from the point a reef extends out about ¼ mile.

**Long Island** is about 9 miles long in a general **NW.** by **W.** direction, and about 4 miles wide, narrowing from the **N.** southward. It is separated from Dall Island by Kaighanee Strait, about 1 mile wide, and extending in a **WNW.** direction about 7 miles, gradually contracting in width to less than ½ mile at How-Kan Narrows, from whence it continues to the **NW.** under the name of Tlevak Strait.

\* The Vancouver Island Pilot—Supplement Notes.—“A ledge which uncovers 3 feet at low water lies **SW.** by **S.**, distant 8 cables from the **SW.** island of the Lord group.” This agrees nearly with the position of Lord Rock. The entire group was carefully examined, and it is not probable that such a ledge exists.

On Long Island, 3 miles above South Point, is a small Haida village, about 1 mile above which are two small islets marking the entrance to a narrow unexplored inlet. Here the strait takes a more westerly direction, and the Indian village of How-Kan is visible to the NW. Two small islets lie close to shore on the eastern side about 1 mile above South Point.

On the Dall Island shore, 2 miles above the northern Kaighanee Harbor, is a moderately deep bight, with some islands at its entrance; a sawmill has been erected here by the mission station at How-Kan; a prominent projecting point forms the northern entrance point of this bight.

American Bay lies  $1\frac{1}{2}$  miles above this point; this bay indents the Dall Island shore a little more than 1 mile in a general SW. by S. direction, with a width of about  $\frac{1}{2}$  mile. On the N. side of the bay,  $\frac{1}{4}$  mile within the entrance, is a group of four wooded islets, called Bay Islets, connected with each other and with the shore at low water. SW. of them is Anchorage Cove, where good anchorage may be found in 15 fathoms.\* The shores of American Bay are free from dangers, and the water, particularly on the S. side, is deep. A trading post of the Northwest Trading Company was formerly located on this bay; the buildings still remain.

Near the middle of the strait, NE. of the N. entrance point of American Bay, is a shoal patch with from 9 to 16 fathoms, on which a vessel may anchor. Immediately opposite the entrance to American Bay a reef, showing at low water, extends nearly 1 cable to the SW. from the Long Island shore with deep water close-to.

How-Kan Narrows, a name given by local navigators to the contracted passage lying  $\frac{3}{4}$  mile above American Bay, being about  $\frac{3}{4}$  mile wide, but with a clear channel of only about  $\frac{1}{4}$  mile wide. A projection of the Long Island shore at this point is the site of the Haida village of How-Kan. A mission station and a post office, to which the name Jackson has been given, are located here.

Directly in front of the village a reef, bare at half tide and surrounded by kelp, extends out a little more than  $\frac{1}{4}$  mile; SE. of the reef, and close-to, is a small island on which are some graves of Indians. The water is deep close to the reef.

SW.  $\frac{1}{2}$  W. from How-Kan Reef is an extensive kelp patch nearly  $\frac{3}{4}$  mile in diameter; in this the least water found was 14 feet. Between this kelp patch and How-Kan Reef is the clear channel to the northwestward; it is about  $\frac{1}{2}$  mile in width, and through it a depth of not less than 17 fathoms can be carried. There is no safe passage W. of the kelp patch.

The kelp is said to disappear in winter from all these reefs, to a greater or less extent, though this is not always the case in the inland waters of Alaska.

The variation of the compass at How-Kan in 1881 was  $27^{\circ} 03' E.$ , and the mean rise and fall of tides is about 12 feet.

In Mission Cove, a small bight N. of the point on which How-Kan village is situated, a small vessel may find anchorage close in shore; a sunken rock with 5 feet of water exists at the head of the cove, and there is a small islet close to the S. shore. From this cove to the NW. point of Long Island is  $2\frac{1}{2}$  miles.

Channel Island lies W NW.  $\frac{1}{2}$  mile from How-Kan village; it appears as two islands, but they are connected by a spit or bar, a little above high water. The island is about  $\frac{3}{4}$  mile long and about  $\frac{1}{4}$  mile wide, and heavily wooded; it trends in an E. and W. direction, having deep water on either side; the main channel, however, is that on the W. side of the island.

From American Bay the E. shore of Dall Island extends in a general NW.  $\frac{1}{2}$  W. direction for about 25 miles, separated from Prince of Wales Island by Tlevak Strait.

About 2 miles above American Bay is the entrance to Saw Mill Cove, from which NW.  $\frac{1}{2}$  mile lies West Mill Rock, bare, of small extent. Portions of Saw Mill Cove are nearly bare at low water; in it are several islands; a waterfall affords good power, but the cove freezes over in winter.

Opposite the entrance of Saw Mill Cove and  $\frac{3}{4}$  mile NW. by W.  $\frac{3}{4}$  W. from the W. end of Channel Island is Pond Rock, awash at low water and usually showing kelp.

The channel lies between Pond Rock and West Mill Rock, after passing which it broadens out to nearly 3 miles in width, connecting by eastward leading passages among the islands with Cordova Bay.

The Dall Island shore is high, densely wooded, and much broken, and should be approached with caution.

Dead Pine Island, of small extent, lies W NW.  $\frac{1}{4}$  W. about  $1\frac{1}{2}$  miles from West Mill Rock; it is rocky, and has a fir tree, and a dead pine stump 20 feet high without branches, situated close to the shore. A reef makes off toward the channel from this island about 2 cables. One-half mile above the island is a small unexplored opening with a small island at its entrance.

Bushy Island, small and covered with bushes, is situated near a rounded point of Dall Island, about 3 miles NW. of Dead Pine Island. Westward around this point at a distance of about 1 mile is the entrance to an unexplored opening, having several islets at its entrance.

Square Island, so named from its appearance, lies on the E. side of the channel, 7 miles above Channel Island; it is small, and is the westernmost of a rather compact group of islands, the largest of which is called Grand Island.

Between this group and Long Island is another group consisting of one large island, called Shoe Island, and eight or nine small islets.

\* Near the anchorage kelp was noted growing in 12 fathoms.

## TLEVAK NARROWS.

A large island to the northward of these groups is called Jackson Island. An unexplored passage to Cordova Bay lies between Jackson and Long Islands. On the N. side of Jackson Island is the Indian village Suckqwan, and between the island and the mainland of Prince of Wales Island is a broad, clear channel, having no known dangers and connecting Tlevak Strait with Cordova Bay.

About  $2\frac{1}{2}$  miles NW. by W. from Bushy Island, and quite prominent, is High Point, from which N NW.  $\frac{1}{2}$  W.  $2\frac{3}{4}$  miles lies Reef Point, the eastern end of Young Island, a large island lying close to the Dall Island shore.

Between High and Reef points is a wide entrance with a number of small islands and rocks in it called Reef Islands; this entrance, which might be mistaken for the main strait, is called False Lead; it has not been explored, but is known to be of considerable extent with several arms leading to the westward, one or more of which may connect with the unexplored inlets entering Dall Island from the ocean.

Reef Point should be avoided, as a dangerous reef of rocks, more or less covered at high water, extend to the southeastward from it nearly  $\frac{1}{2}$  mile. The eastern end of this reef, is a sunken rock.

Opposite Reef Point the main shore is about 3 miles distant northeasterly and forms a rather broad rounded point called Point Kellogg, just E. of which is a wide open bay or inlet extending to the northward and called Dunbar Inlet.

Tlevak Strait, between Reef and Kellogg points, opens in a general NW. by W. direction, with a width of 3 or 4 miles and a length to Tlevak Narrows of about 13 miles.

From Kellogg Point the eastern shore of the strait extends, much broken, to the northwestward to a prominent point caused by a landslide, beyond which is a broad open bight in Prince of Wales Island.

Between Point Kellogg and the landslide, extending off shore from 1 mile to  $1\frac{1}{2}$  miles, are three groups of islands.

The first, or McFarland Group, consists of three good-sized islands, the smallest of which is  $\frac{1}{4}$  mile long. The second, or Corlies Group, consists of two islands each over  $\frac{1}{2}$  mile long. The third, or Nichols Group, consists of three islands, narrow and close to each other, forming a chain nearly 2 miles long in a NW. and SE. direction.

Off this latter group to the westward are five small islets, of a uniform size, called The Sentinels. The West Sentinel is  $10\frac{1}{2}$  miles NW.  $\frac{1}{4}$  W. from Square Island, and is about  $\frac{1}{2}$  mile westward from the rest of the group.

From the Nichols Group kelp extends westward nearly to mid-channel.

The western shore of Tlevak Strait between Reef Point and Tlevak Narrows is high, wooded, and much indented by bays; the largest of these is Breezy Bay; strong winds were encountered here during the reconnaissance, the land to the westward by its peculiar formation seeming to concentrate the winds, which in the strait, out of this influence, were more moderate.

Eolus Point, the southern point of entrance to Breezy Bay, is 5 miles NW. by W.  $\frac{3}{4}$  W. from Reef Point; the northern headland is Boreas Point, about 2 miles NW. from Eolus Point, and having a small islet close to it.

The shores are quite irregular; there are some rocks and an islet of moderate size in the bay which has not been otherwise examined. It has been used as an anchorage, but no details of the locality have been received.

A little more than 1 mile beyond Boreas Point is another point with some rocks, extending a short distance northwestward from it. This point forms the southern headland of a bight of which Hassler Point, 3 miles farther northwestward, is the northern headland; there is a narrow island close in shore E. of Hassler Point, and a rock about  $1\frac{1}{2}$  cables SE. from it. The bight is divided into two small bays by Cayman Point, and though neither have yet been examined, the northern one, called North Bay, presents the appearance of being a good waiting place for vessels bound through the narrows, provided the depth of water is suitable for an anchorage.

Hassler Point.—Here the strait begins to contract, and a group of several small and two large islands, called Lively Islands, extending  $1\frac{1}{2}$  miles in an E. and W. direction, obliquely across the strait, still further diminish the width of the channel to less than 3 cables between the islands and Hassler Point.

From this vicinity the strait contracts, in a distance of 2 miles, to the extremely narrow passage known as Tlevak Narrows, after passing which, it again expands somewhat, and, under the name of Ulloa Channel, joins Bucareli Bay through Port Refugio.

Block Island, nearly in mid-channel of Tlevak Narrows, is a small rocky island wooded on top and connected by a kelp-covered reef with the shores to the eastward. The point forming the western limit of the narrows has received the name of Turn Point; it has a small bight on its S. side, in which are rocks and kelp. About  $\frac{1}{2}$  mile N. of Block Island, on the eastern shore, is Boulder Point, a low point covered with white boulders; from its extreme a line of islets, with passages between, trend for 1 mile to the westward across the strait. The westernmost of these islets, close to the western shore, is called Bush Island. There are rocks, generally with kelp on them, at the W. edge of Block Island and at the N. extreme of Turn Point. Between Block Island and Turn Point no bottom was found with 7 fathoms of line.

The tide rips and whirls are very strong in the narrows, and it is not advisable, with our present lack of knowledge, to attempt the passage during the strength of the tide or in the absence of local knowledge.

**Tides.**—No study has yet been made of the tides at Tlevak Narrows. It is probably high water, full and change, at about 12<sup>h</sup> 30<sup>m</sup>, as in other parts of southeastern Alaska, with a rise and fall of 12 to 15 feet.

Lieutenant Emmons, U. S. N., who passed through the narrows in 1888, notes: "It gives a better channel than Sergius Channel (Peril Strait), I should say, although there is quite a sharp turn coming from the northward."\*

It is probable that during the strength of the tide the current is about 10 knots an hour. It is said that the tides meet near the Lively Islands, but this is not yet verified.

DIRECTIONS.—CAPE MUZON TO BUCARELI BAY.

Entering Kaighanee Strait between Cape Muzon and South Point, a mid-channel course **NW.** by **W. ½ W.** will carry clear, until up with the projecting point near the sawmill, when a **W.** course heads for the entrance to American Bay, which affords a good anchorage in 15 fathoms about ¼ mile **SW.** of the Bay Islets. A vessel may anchor temporarily off the village, but the bottom is rocky, and the water deep close to the shore.

The reefs off the village of How-Kan are well marked by kelp. Vessels bound to the northward, after rounding the large kelp patch on the **W.** side of the channel, should keep the western shore close aboard to avoid **Pond Rock**, awash at low water, which does not always show kelp. **Pond Rock** bears from the entrance point of Sawmill Cove **NE.** by **N.**

**West Mill Rock** may be passed at 1 cable distance, and **Dead Pine Island** should be given a berth of ½ mile, from whence a course **NW. ½ W.** carries clear, passing ½ mile to the westward of **Square Island**.

When **Square Island** bears **E.**, a **N.** course should be steered for the **McFarland Islands**, for a distance of 2½ miles, from whence a **NW. ¾ W.** course carries clear to the entrance of Tlevak Narrows, keeping a good lookout for kelp, which usually marks all dangers.

The entrance to the narrows is to the westward of **Block Island**, a reef and kelp nearly close the passage on its eastern side.

Keep a mid-channel course between **Block Island** and **Turn Point** until well past the point, in order to clear a reef, marked by kelp, lying in the light westward of the point. The range of **Boulder Point** ahead, and the shore line immediately **S.** of **Turn Point** right astern, until **Bush Island** opens clear of the **S.** shore, carries through clear of all danger.

The course then is to the westward of all the islands; after passing which, the strait widens out again, and at a distance of 12 miles through **Ulloa Channel** and **Port Refugio** connects with **Bucareli Bay**.

**NE.** of Cape Muzon lies the broad entrance of a deep and wide indentation called **Cordova Bay**. It has not yet been surveyed and is but little known.

**Point Marsh** is the eastern entrance point of **Cordova Bay**; it lies **NE. ½ E.** 13 miles from Cape Muzon; it is a bare and comparatively low and narrow point, with a small group of rocky islets lying close to the point. From **Point Marsh**, **Point Munez** bears **E NE. ¾ E.**, distant 8 miles.

Near the middle of **Cordova Bay** entrance lies **Dewey Rock**, bare, 30 feet high, and with deep water close to; from it **Point Marsh** bears **E NE. ¼ E.**, distant 5 miles.

There is a group of islands to the westward of **Point Marsh**, extending several miles out from shore. Near the head of the bay are several deep inlets projecting to the northward; from one of these inlets, called **Tliakaek Bay**, a portage to **Cholmondeley Sound** is said to exist.

About 2 miles **NE.** from **Point Marsh** lies the entrance to **Brownson Bay**, a narrow inlet 2½ miles long in a northerly direction, and nearly closed by islands and rocks at its entrance, where the tides run very strong. It does not afford any proper anchorage.

North of **Point Marsh** is a reddish colored, remarkable cone-shaped hill, with rounded top; it is a prominent landmark.

**Point Nunez**, which forms the western entrance point to **Nichols Bay**, lies 8 miles **E.** by **N. ¼ N.** from **Point Marsh**. It is in

Latitude .....	54° 40' 55" N.
Longitude .....	132° 05' 05" W.

and is described as having very precipitous sides with no landing on its seaward face. The point is readily recognized on approaching it from either side; it is on **Bean Island**, the largest and southernmost of a group at the western entrance of the bay.

**Nichols Bay** affords a fair anchorage, with good protection when once inside. The entrance, however, is exceedingly narrow, with outlying dangers, though when once in, it is comparatively clear. The surveying steamer **Patterson** rode out a heavy **SE.** gale here, and only the most severe willi-

\* Lieutenant Emmons traveled in a steam launch belonging to the Klawak cannery.

## CLARENCE STRAIT—DESCRIPTION.

waws were felt inside. The entrance of this bay should not be attempted in bad weather without local knowledge; in heavy southerly weather the entrance looks forbidding and is dangerous.

At the head of the bay is a large fresh-water lake connected by a rough stream, where, in the season, thousands of salmon die in their attempts to scale the rocks.

There are three anchorages in Nichols Bay; one in each of the three bights on the southwestern shore; the center one is the only one desirable. The first bight looks favorable, but there are rocks that cover at high water, and a strong current draws through with the tide. The upper anchorage is too small.

In bad, southerly weather, the sea breaks entirely across the entrance, and only local knowledge and good judgment can safely carry in a vessel.

## DIRECTIONS FOR NICHOLS BAY.

In good weather a **W NW.  $\frac{1}{2}$  W.** course, with the entire length of the bay open, carries in clear until Cape Chacon is shut in, when keep the northern shore aboard until up with the anchorage, in the center bight, when an anchorage can be selected in 7 to 10 fathoms.

The **Nunez Rocks**, previously described, lie **SSE.  $\frac{1}{2}$  E.**, 1 mile from Point Nuñez; they cover at half tide.

**Cape Chacon**, sometimes locally known as **Musatchie Nose**, lies 3 miles **NE.  $\frac{3}{4}$  E.** from Point Nuñez; it is at the extreme **SE.** extremity of Prince of Wales Island, and is the turning point from the westward into Clarence Strait.

Viewed from the westward Cape Chacon is described as showing three distinct cones, the inner one somewhat flattened and elongated, with high land to the northward and westward. The cape itself is rather low, and **E SE.  $\frac{1}{2}$  mile** from it is a rock which bares only at extreme low water. The current runs very strong about this cape, and it should be given a berth of at least  $\frac{3}{4}$  mile.

From the eastward the cape presents nearly the same appearance, with the peculiar conical hills, all heavily wooded.

## CLARENCE STRAIT.

This is the easternmost of the three great inlets entering into southeastern Alaska from the sea; the others being Sumner Strait and Chatham Strait.

At its entrance between Cape Northumberland and Cape Chacon, Clarence Strait is 25 miles in width, the eastern side of this entrance being somewhat obstructed by the bare rocks and reefs lying **S.** of Duke Island, and previously described.

In its general navigation it is remarkably clear of dangers.

Except Duke Island the land on both sides of the strait is high and mountainous, Prince of Wales Island presenting a succession of most noticeable peaks. At the **S.** end of Duke Island is **Mt. Lazaro**, 1,767 feet high, and noticeable as a solitary broad-topped mountain; it can be seen from a long distance, appearing as a high island, before the main part of the island is visible.

**Annette Island** is a succession of high mountains, **Mt. Tamgas**, 3,684 feet high, being the most noticeable and often showing snow on its summit the entire year.

**Gravina Island** has two parallel ranges running its entire length with a low valley between.

**Cleveland Peninsula** is high and mountainous.

The whole is heavily wooded with spruce, hemlock, and cedar, with most of the peaks and numerous patches quite bare.

**Hassler Reef\***, lying **SW. by W.  $\frac{1}{2}$  W.**, 10 miles from Cape Northumberland, uncovers 10 feet at extreme low water; it shows a mass of kelp; it is dangerous, but by keeping to the westward of mid-channel of the strait all dangers will be avoided.

## GENERAL DIRECTIONS FOR CLARENCE STRAIT.

**Barren Island**, previously described, is the key to all navigation to or from Clarence Strait to the eastward.

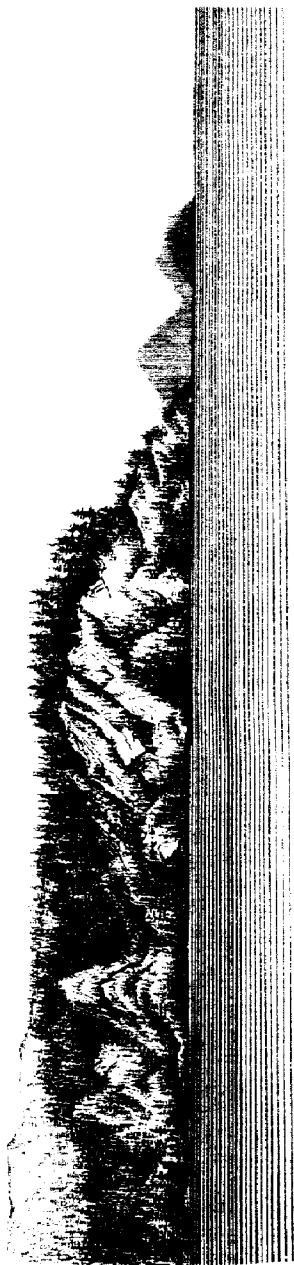
From the westward, if bound up Clarence Strait, pass Nuñez Rocks. Point Nuñez is bold and bluff. When past Cape Chacon, giving it a berth of at least  $\frac{3}{4}$  mile, it is usual to steer about **N.** by **E.  $\frac{1}{4}$  E.** for 8 miles, when a **NW.** by **N.** course leads directly up the strait, passing  $1\frac{1}{2}$  miles to the eastward of the ledge lying **SE.  $\frac{1}{2}$  E.**  $1\frac{1}{4}$  miles from Wedge Island; this ledge covers at high water.

When Vallenar Point bears abeam **NE.** by **E.**,  $3\frac{1}{2}$  miles distant, a course may be laid **W NW.  $\frac{1}{4}$  W.**, to continue up Clarence Strait, or **N.  $\frac{1}{4}$  W.**, to enter Behm Canal.

## DESCRIPTION OF CLARENCE STRAIT.

In the quadrilateral of Point Davison, Cape Northumberland, Zayas Island, and Cape Chacon, the tides are irregular and much confused, and large masses of dangerous looking kelp are kept floating in the eddies for days, being only broken up by a strong wind. These should advisedly be approached

\* This is without doubt the reef reported by Captain Brundige, though his bearings would not so confirm it.



Astr. Sta.

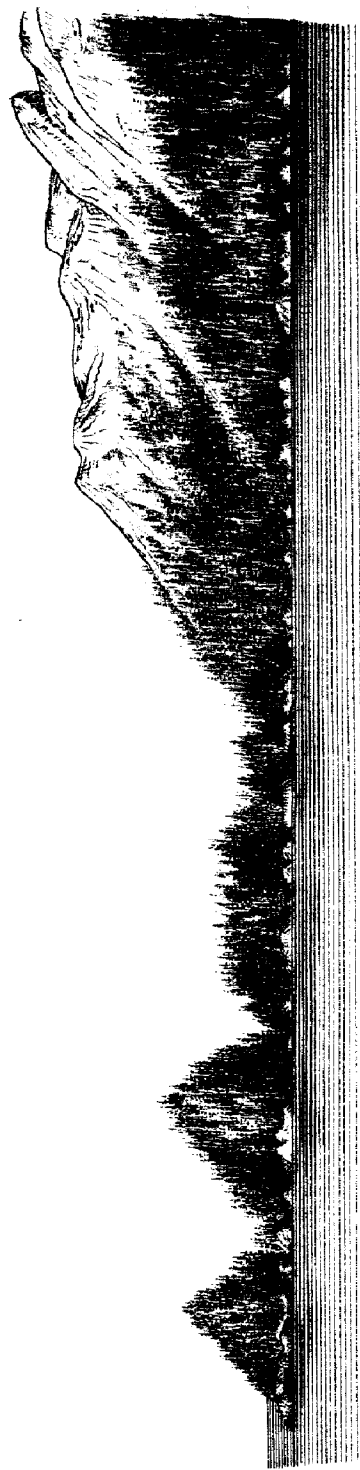
Astronomical Station, Point Nuñez, Pr. Wales Island, Alaska



Pt. Nuñez

Cape Chacon

Cape Chacon and Pt. Nuñez, Pr. Wales Id. W.S.W.(mag.) 8 Miles



Cape Chacon S. W. 6 Miles

with caution, though of the many examined none presented any dangers and were invariably in deep water.

The western shore of Clarence Strait is broken by many deep and narrow inlets, and close along the shores are numerous small islands.

**Stone Rock**, bare, 20 feet high, lies N.  $\frac{1}{4}$  W.  $3\frac{1}{2}$  miles off shore; it is dangerous to pass to the westward of it.

**McLean Arm** is a narrow deep inlet lying about 6 miles above Cape Chacon. It is clear of dangers. There is an anchorage at the head of the arm in 35 fathoms, irregular rocky bottom; the williwaws come down strong from the adjacent mountains; it is easy of access, but cannot be said to afford a proper anchorage. The shore from Stone Rock to McLean Arm is infested with sunken reefs and kelp patches.

**Gardner Bay** has a shoal and very narrow entrance, with a strong current in and out, except at slack water. It is very snug when once inside, particularly the inner harbor, where there is an abundant supply of fresh water at all seasons. The entrance to the inner harbor should not be attempted, even in the best of weather, without some local knowledge; it is to the northward of the rocky islet, where there is 3 fathoms at low water and numerous reefs. There is no safe anchorage in the outer harbor.

**Kendrick Bay**, having a large group of good-sized islands on the northern side of its entrance, lies 10 miles above Cape Chacon. Neither this bay nor Ingraham Bay, lying 7 miles further N., afford any desirable anchorage.

**Chichagof Bay** does not afford an anchorage.

**Moira Sound** entrance lies in latitude  $55^{\circ} 05' N.$  Its general direction is N NE. and S SW., and its length about 12 miles. About  $2\frac{1}{2}$  miles from the entrance an arm about  $5\frac{1}{2}$  miles long and  $1\frac{1}{2}$  miles wide branches from the W. side of the sound and extends in a general W NW.  $\frac{1}{2}$  W. direction. A large fresh-water lake empties into this arm through a ravine about  $\frac{3}{4}$  mile long and 100 yards wide, and so perfectly straight that a clear view is had along its entire length. The head of this arm is a large land-locked basin accessible only for boats. It is a favorite salmon-fishing place for the Indians. At the head of this basin is Endora Mountain, 3,500 feet high and prominent.

**Menafee Anchorage** lies inside the islands and reef off the S. entrance point of Moira Sound, with its entrance between White Rock and that point. It is perfectly protected from all seas and winds, but is small, with a very narrow entrance, with an irregular bottom of ragged rock in from 2 to 40 fathoms. No particular sailing directions are given, and the anchorage is not recommended.

**Moira Sound** has several groups of islands across its entrance; the two most marked natural objects in these groups are **Moira Rock**, which stands out by itself and is bare of all vegetation, and **White Rock**, which is the bare N. face of the second largest island; it is the Astronomical Station of that portion of the survey and is in

Latitude .....	$55^{\circ} 03' 17'' N.$
Longitude .....	$131^{\circ} 58' 41'' W.$

There is no passage into Moira Sound S. of White Rock.

There is a kelp patch  $\frac{3}{4}$  to  $\frac{1}{2}$  mile N NE. from White Rock, and NE. by E.  $\frac{3}{4}$  E.,  $\frac{1}{4}$  mile from the rock, is an outlying ledge which bares at low water; this is the only outlying danger immediately off the entrance to Moira Sound.

**Point Adams**, the N. entrance point of Moira Sound, is the extremity of a large, high peninsula formed by the N. arm of the Sound and an inlet from Clarence Strait. The best entrance to the sound is the passage between this peninsula and Moira Rock, from whence a mid-channel course up the sound carries clear of all dangers.

About  $\frac{1}{2}$  mile S. of the entrance to the N. arm of the sound lies **Niblack Anchorage**. It is a little out of the way, but the entrance on the N. side of Moira Rock is comparatively free from all dangers, and a straight course may be laid from outside to the anchorage. It is an almost entirely land-locked basin, with surrounding high land sheltering it from any swell and almost completely from any wind. The harbor is not large; the entrance opens to the eastward and is narrow, but is free from all dangers.

#### DIRECTIONS FOR NIBLACK ANCHORAGE.

From a point midway between Moira Rock and Point Adams, a course S SW.  $\frac{1}{4}$  W., leads directly to the entrance to the outer harbor. Safety Rock, which is the westernmost of the group of small islets at the entrance to the anchorage, should be passed to the northward; it has deep water close to on that side.

When midway between Safety Point and Safety Rock a SW.  $\frac{1}{2}$  W. course leads across the outer harbor clear of all dangers; the ledge on the S. side of the outer harbor shows plainly at half tide.

The entrance to the inner harbor is narrow but bold, and a tidal current of 1 to 2 knots makes through the passage. When this entrance is well open haul up for it until the head of the bay is open. From mid-channel of the narrow entrance a W. by N. course leads directly to the anchorage in 7 or 8 fathoms, with the small rocky islet bearing N.  $\frac{1}{2}$  E. On the SW. side of and close to this islet is a rock that covers at half tide and shows kelp.

Near the head of the anchorage on the S. shore is a peculiar red rock, standing upright near low-water mark; it is square in cross-section and about 20 feet high. It can be seen from the outside, just along the S. shore line. The anchoring ground is just beyond this red rock.



There are several streams of water near the anchoring ground, and a large lake NW. of the head of the anchorage.

**Tides.**—It is high water, full and change, at 0<sup>h</sup> 19<sup>m</sup>, with a mean rise and fall of 11 feet at Niblack Anchorage.

At a distance of 8 miles from Moira Rock, Moira Sound divides into two arms; the western one, after running in a westerly direction about 2½ miles, again divides into two short arms, neither of which afford an anchorage. The southern arm trends about SSW. for nearly 5 miles, and from its head is said to be a portage to an inlet from Cordova Bay.

There are several small indentations on the southern shore of the sound, and on that side are also some islands and sunken reefs and rocks. The waters of the sound are deep, and afford no anchorages other than the two mentioned.

North of Point Adams is a narrow, deep inlet, running about WSW. for 2 miles; it does not afford an anchorage.

**Wedge Islands** are a compact group of several large and numerous small islets and rocks, lying 2¼ miles N. of Point Adams, and about 1¼ miles off the shore, which here forms a deep bight. At a distance the group presents something like the appearance of a wedge, with the head inshore.

From Wedge Islands, Dall Head, on Gravina Island, bears ENE., distant 7 miles.

Between Wedge Islands and the shores to the westward are numerous reefs and islets; and 1 mile SE. ½ E. from Wedge Island is a reef, a portion of which shows at low water; it probably shows kelp. This reef is a somewhat serious danger to vessels attempting to make Niblack Anchorage from the northward; it bears from Point Adams NNE. ½ E., distant 2 miles.

About 1½ miles NW. ¾ N. from the northern Wedge Island is the N. point of the bight lying northwestward from Point Adams. From this point the shore line trends about NW. ¾ N. for 5½ miles to Chasina Point, which is the eastern or southern point of entrance to Cholmondeley Sound. In this distance the shores are quite irregular, with some outlying rocky ledges.

**Chasina Point** is a long, moderately low, heavily timbered point. Its eastern shore line is somewhat irregular, with many rocky islets close in shore.

**Chasina Anchorage** lies just inside Chasina Point, in Cholmondeley Sound; in rounding the point it should not be approached nearer than ½ mile to avoid a dangerous reef, which bares at low water, lying about ¼ mile off shore to the northward and westward.

This anchorage is only a lee from South Easters, and its only recommendation is its accessibility and convenience to the main channel of Clarence Strait. The anchorage, for which no particular directions are necessary, is in 19 fathoms, rocky bottom, with the W. end of the largest island bearing N., distant about ¾ mile. The mean rise and fall of tides at the anchorage is 13 feet.

**Skin Island**, low and wooded, forms the W. entrance point to Cholmondeley Sound. The island is about ½ mile long N. and S., and on its W. side is a fair anchorage, affording a lee in case of a SE. gale. The bottom is not uniform, being rocky, sandy, and muddy at intervals. From the S. end of Skin Island a dangerous reef, which bares at half tide, makes out one-third the distance to the point of the mainland lying S. of it. This passageway carries 25 fathoms in its deepest part, but it is not particularly recommended.

**Cholmondeley Sound** is a deep inlet entering into Prince of Wales Island at about latitude 55° 17' N.; at its entrance the sound is about 1½ miles wide. Its extreme length is about 16 miles; it has several arms, all of which are deep and bold, and generally free from dangers.

**Dora Bay**, on the S. side, about 6 miles inside the entrance to the sound, is the only anchorage in the sound, and it is not recommended. There is an irregular ridge across its entrance, and the anchorage at the head of the bay is in 35 fathoms; the least water found on the ridge was 9 fathoms.

**Clover Bay.**—The entrance to this small inlet lies 1½ miles W. by S. ¼ S. from Skin Island. Its SE. entrance point is foul; the N. shore line is free from danger to the island at the head of the bay. Clover Bay has not been thoroughly examined; it is probably a fair anchorage, but is not especially recommended.

**20-Fathom Bank.**—About 3 miles NW. of Skin Island is a 20-fathom bank, extending to the northward about 3 miles from the shore of the mainland; from the N. point of this bank to High Island, in Kasaan Bay, less than 30 fathoms were found; this bank has been thoroughly examined, and not less than 18 fathoms found.

**Island Point** is the S. point of entrance to Kasaan Bay. It is a square-faced promontory of moderate height, about ¼ mile wide on its face and projecting northward about ½ mile. 1¼ miles NW. from Island Point are Patterson and High islands, close together, with a small rocky islet close to High Island on its eastern side. Patterson Island is high, rounded, and wooded. S. of the middle of Patterson Island, distant about ¼ mile, is a rock which covers at half tide. There is a deep passage about ¼ mile wide between Patterson Island and the mainland; it is not known to present any dangers.

**Grindall Island**, lying N. by E. 4¼ miles from Island Point, forms the N. entrance point to Kasaan Bay. This island is about 1½ miles long E. and W.; it is heavily wooded and has two knobby hills, the westernmost one being about 200 feet high, the other about 150 feet.

**Kasaan Bay** from these entrance points extends in a westerly direction about 17½ miles. Its extreme western end is shoal with numerous low wooded islets. On its N. side about 5½ miles from

Grindall Island is a reef, showing at low water about  $\frac{1}{4}$  mile off shore. This reef lies off a marked ragged cliff on the side of the mountain.

**Karta Bay**, on the **S.** side of the head of Kasaan Bay, is one of the best anchorages of Alaska. Just to the eastward of Karta Bay is a small cove in which is located the wharf and packing house of the **Baronovitch Fishery**; the approach to this wharf is impeded by a shoal, and the anchorage in the cove is not good; vessels should anchor in Karta Bay.

In the middle of Kasaan Bay are several islands, the most noticeable being Long Island, about 2 miles in length, low and wooded, and Round Island, a small, round, conical, wooded islet lying **W. NW.** of Long Island.

The **N.** side of Kasaan Bay to near its head is a high, steep mountain ridge, heavily timbered. On the **S.** side the land is lower and there are several inlets, the eastern one being called **Skowl Arm**; it is about 12 miles long, and the head of it is only about 2 miles from the head of Cholmondeley Sound, though the intervening land is very high. The eastern entrance to this arm is known as **Skowl Point**; it is really a group of small islands lying close in shore 2 miles **W.** of Patterson Island. There are some outlying bare rocks off this point **W.** by **N.** about  $\frac{1}{4}$  mile, visible at all tides, with a 20-fathom passage inside them. On its **N.** side  $2\frac{3}{4}$  miles up the arm is the Haida village of Kasaan;\* in front of the village is a shelving beach of gravel which does not afford an anchorage. A very indifferent anchorage in 30 fathoms may be obtained on the **W.** side of the mouth of the narrow inlet, on the opposite shore of Skowl Arm, about **S SW.** from Kasaan village.

#### DIRECTIONS FOR SKOWL ARM.

A mid-channel course up Skowl Arm is free of all dangers up to 1 mile beyond the village; beyond that neither the arm nor its branches are navigable for vessels of any size, owing to the narrowness, the sharp turns, islands, rocks, kelp patches, and currents; small vessels, entering with caution, might find an anchorage in either branch of the arm.

The passage between Long Island and the mainland to the southward has not been examined, but it is supposed to contain considerable foul ground; the passage **N.** of the island should, therefore, always be used.

**Baker Point** lies **SW.**  $\frac{3}{4}$  **W.** about  $\frac{3}{4}$  mile from Long Island, with Berry Island lying between; the point is low and heavily timbered. **SW.** from Baker Point about  $2\frac{1}{2}$  miles is a bight having a fairly good anchorage called **Coal Bay**; there are considerable coal croppings at the head of this bay. At the **W.** entrance point of this bay a reef covered at about  $\frac{3}{4}$  flood extends nearly **N.** from the point about  $\frac{3}{4}$  mile. It is probable that winter gales blow hard into Coal Bay and send in considerable sea.

On the **W.** side of this point and reef is a bay, not named, about  $1\frac{1}{2}$  miles deep and nearly  $\frac{1}{2}$  mile in width, which appears to afford a good anchorage, though it is but little known.

**Twelve Mile Arm**, an inlet extending **S.** from near the **W.** end of Kasaan Bay, is narrow, about 12 miles in length, and is comparatively shallow; it is free from dangers, and a somewhat contracted anchorage may be found anywhere along its entire length, though it presents no particular advantages.

**Sandy Point** is the **NW.** point of entrance to Twelve Mile Arm; it is  $1\frac{1}{4}$  miles **E SE.** from Karta Bay entrance. A boulder flat, partly visible at low water, extends  $\frac{1}{2}$  mile **E.** by **N.** from the point.

On the opposite side of Kasaan Bay, **NE.**  $\frac{3}{4}$  **N.** from Sandy Point, is an extensive boulder flat, partly visible at low water, extending  $\frac{1}{2}$  mile off shore.

From the head of Kasaan Bay a low marshy valley extending to the northward  $1\frac{3}{4}$  miles forms a portage to Tolstoi Bay.

**Landmark.**—On the **E.** face of the lower peak of Grindall Island is a white patch which is visible for 15 miles.

**Anchorages.**—There is an anchorage along the **N.** shore of Grindall Island in something less than 20 fathoms, which affords a fairly good lee during **SE.** weather; there are no dangers in the approaches. In the passage between Grindall Island and Point Grindall is also an anchorage; it is, however, somewhat contracted and not well protected, except from the northwestward. This anchorage is at the head of the little bay which enters into the face of Point Grindall on the **W.** side of the passage in 16 fathoms, rocky bottom.

To reach the anchorage from Clarence Strait no dangers are to be encountered on the **W.** side of the passage. The small islet may be passed within 20 yards.

\* This village is rather out of the way of ordinary travel, and has in a great measure preserved its native characteristics. It consists of about 17 houses, and has a winter population of about 175 persons. It has lost much of its prestige since the death of its well-known Chief Skowl, whose wealth, and enormous stature and obesity made him a notable man on the coast. During the summer season this village is entirely deserted, the inhabitants being off either in summer camp collecting their winter supply of salmon, or at work at the adjacent fisheries. The natives of this village call themselves Haidas; they belong to the Haida family of Queen Charlotte Islands and the mainland. Ethnologically, they and all their kindred on the southern end of Prince of Wales Island are classified as the Kaighanee branch of the Haida family, but their relationship to the Queen Charlotte Haidas is closer than to the natives of the adjacent mainland about Queen Charlotte Island. There are now only five villages and about 800 Kaighanees on Prince of Wales Island.

## KARTA BAY—DIRECTIONS.

Grindall Passage offers no serious difficulties in clear weather when well studied out. It is not specially recommended, as it does not save much over the main entrance to Kasaan Bay. Passing through from the northward a mid-channel course carries clear of all dangers.

The small islet off the southeast part of Grindall Point is nearly surrounded by reefs, showing kelp; and S. of the southernmost of the islets close to Grindall Island is a reef nearly  $\frac{3}{4}$  mile long, also showing kelp.

## DIRECTIONS FOR KARTA BAY.

Entering Kasaan Bay  $\frac{3}{4}$  mile S. of Grindall Island, a W.  $\frac{3}{4}$  N. course for  $9\frac{1}{2}$  miles will carry clear of all dangers until Round Island bears S. about  $\frac{1}{2}$  mile distant, from whence a W.  $\frac{1}{2}$  N. course with Mound Point, a bluff white point at the W. entrance to Karta Bay, directly ahead, leads clear to the entrance of the bay; passing nearly midway between the boulder reefs off Sandy Point and off the opposite shore, both of which are bare at low water, anchorage may be selected in any part of Karta Bay in 8 to 10 fathoms, muddy bottom.

Vessels entering Kasaan Bay from the southward should take a mid-channel course between High and Grindall islands, steering to pass about  $\frac{1}{4}$  mile N. of Long Island, whence the previous directions may be followed.

Streets Island is a bare rock about 10 feet above high water, lying  $1\frac{1}{2}$  miles above Grindall Island and  $\frac{1}{4}$  mile off-shore. There is a clear passage inside this rock, but there is nothing to recommend it.

Caamano Point lies  $5\frac{1}{2}$  miles N NE. from Grindall Island. It is a low, rugged point with numerous bare, rocky islets lying close to; it is heavily wooded and rises rapidly back to the high land of the peninsula. The water is deep close to the outlying rocks and kelp reefs. This point is the extreme southern point of Cleveland Peninsula, and is the dividing point between Clarence Strait and the broad northern entrance to Behm Canal.

The eastern shore of Clarence Strait from Cape Northumberland to Caamano Point is formed by the three large islands called Duke Island, Annette Island, and Gravina Island, with many small islands interspersed among them.

Cape Northumberland, on the S. point of Duke Island, is NE.  $\frac{1}{2}$  N.,  $2\frac{1}{4}$  miles from Cape Chacon and W. by S.  $18\frac{1}{2}$  miles from Cape Fox. It is a low, wooded point, with a low, wooded islet called Vancouver Islet lying close to. To the N. of the cape is the very prominent, flat-topped, Mount Lazaro 1,787 feet high.

Duke Island is low and heavily timbered, showing numerous round-topped hills from 200 to 500 feet high.

Hassler Reef is the westernmost of the line of reefs and rocks surrounding Cape Northumberland, and is already described on page 74.

Point White, the western point of Duke Island, is a bluff, high, wooded point. Kelp patches and reefs extend for more than 5 miles off shore to the southward, rendering the navigation of that vicinity dangerous in the extreme.

N. of Duke Island and separating it from Annette Island is Felice Strait. Its western entrance is impeded by numerous islands, the Percy Islands being the westernmost; these islands are low, rocky, and heavily timbered; the outer or westernmost island has a steep, rocky bank about 175 feet high to tops of trees, and is called Point Percy. The northernmost of the Percy group is a cluster of small bare rock.

The passage between Percy Islands and Duke Island, called Sealed Passage, is filled with sunken reefs and should not be attempted. Between Point Percy and Cape Northumberland are supposed to be many sunken and dangerous reefs, and the locality should be avoided. Hassler Reef is  $5\frac{3}{4}$  miles S SE. from Point Percy.

Point Davison is the southern point of Annette Island; it is a low, wooded point, and on its SW. face are many reefs and bare rocks extending off shore nearly 1 mile.

Felice Strait, extending through between Clarence Strait and Revillagigedo Channel, has its navigable entrance between Point Davison and Point Percy.

Hotspur Island, low and thickly wooded, appears from Clarence Strait to block the entrance to Felice Strait.

Off the eastern face of Point Davison are many rocky islets and reefs, but they are easily avoided. A small island called Harris Island lies close N. of Hotspur Island; they are connected by a sand beach awash at extreme high water. There is a boat anchorage just E. of Harris Island.

Tamgas Harbor lies NW. by N. of Hotspur Island; it affords complete shelter in all weathers. Survey Point, on Annette Island, forms the eastern entrance point of Tamgas Harbor; it is 1 mile N. of Hotspur Island; the point is rugged, not very high, and fringed by a narrow ledge.

Tamgas Harbor.—About 4 miles within the western entrance of Felice Strait is the entrance to this land-locked harbor, guarded by Grass Rock on the W. and Mule Rock on the E.

Grass Rock lies N NE. 3 miles from Point Davison, with a group of small rocky islets between. There are no mid-channel dangers; the rock is about 15 feet above high water, grass covered, no trees, and about 75 feet in diameter. S SE.  $\frac{1}{2}$  mile from it is a rock showing at low water, and marked by kelp.

**Mule Rock** lies **E NE.**  $\frac{1}{4}$  **E.**  $\frac{3}{4}$  mile from Grass Rock and about  $\frac{1}{4}$  mile off the eastern shore; it is bare and awash at extreme high water. On its northern side, close-to, is a sunken rock marked by kelp. Ordinarily Mule Rock shows about 60 feet long by 30 feet wide.

From **Survey Point** the shore line of Tamgas Harbor to the northward is high, with a narrow, rocky ledge extending well out at low water and at high water showing several rocky heads; the bank then becomes steep, with deep water close-to, until past the Indian village which lies just above the fine salmon stream coming down from a large mountain lake.

The **W.** shore of Tamgas Harbor entrance is shoal and should not be approached nearer than  $\frac{1}{2}$  mile; a shoal extends about  $\frac{3}{4}$  mile **E.** by **S.** from Deer Point, having but 14 feet of water and not marked by kelp.

The eastern shore is timbered and rises rapidly to the high peak of Annette Island, while the western shore is low and flat, but heavily timbered, with a sand and shingle beach extending well out at low water.

The **E.** shore continues steep and bold, except a small sand beach off the village, and curves slightly to the westward; at midway from the village to Yellow Point shoal water begins to make out a long distance from high-water mark; and on the opposite shore, from Tent Point to Crab Point, are boulders, and a shingle and sand beach extending to mid-channel at low water, thus narrowing the channel to the inner harbor to 125 yards at low water, but with a depth of not less than  $7\frac{3}{4}$  fathoms.

The southern part of the inner harbor is shallow, and the low-water mark is a long distance out. In the middle of the southern part is a shoal with 15 feet, but it does not interfere with the anchorage for small vessels. There is no proper anchorage in the outer harbor; in the inner harbor a vessel may anchor anywhere in from 5 to 8 fathoms.

**Purple Mountain**, 2,447 feet high, is bare, and the other mountains are wooded.

**Mount Davison** is the most conspicuous and is 2,650 feet high; it has rather a sharp peak. Chapeau Mountain is but a spur of Mount Davison. Near the Indian village is a stream which is the outlet of a chain of mountain lakes; many salmon frequent this stream.

The whole southeastern peninsula of Annette Island from Yellow Hill to Point Davison is low and heavily timbered, with occasionally swampy places. As a rule mountains more than 2,000 feet high are bare and rugged on their tops.\*

The coast line of Annette Island, from Survey Point to the eastward to Annette Point, is low and wooded, with high land some distance back; the shore is fringed with ledges and rocks covered at high water, but at that time well marked with kelp.

**Ajax Reef**,  $2\frac{1}{2}$  miles **E NE.**  $\frac{1}{4}$  **N.** from Harris Island and about  $\frac{3}{4}$  mile off shore, covers at three-quarters flood; it is marked by kelp, and has deep water moderately close-to, with the shoalest part toward Annette Island.

**Vegas Islands**, lying **E.** of Hotspur Island and close to the Duke Island shore, are low and wooded.

**Tamgas Reef** lies  $1\frac{3}{4}$  miles **N NE.**  $\frac{1}{2}$  **E.** from the Vegas and  $\frac{5}{8}$  mile off the Duke Island shore; it shows several heads, is awash at high water, and shows no kelp.

**Annette Point**, the southeastern end of Annette Island, is  $3\frac{1}{2}$  miles **NE.** by **E.**  $\frac{1}{2}$  **E.** from Survey Point; it is a moderately high, rocky, wooded point, rising somewhat rapidly to the high land to the northward.

**Snipe Island** lies  $\frac{1}{2}$  mile **S SE.**  $\frac{1}{2}$  **E.** from Annette Point; it is a treeless, grass-covered rock, about 20 feet above high water and about 80 feet in diameter; it is fringed with kelp, with moderately deep water close-to.

The **N.** shore of Duke Island is a succession of bights and shallow inlets, with numerous rocks and islets close in shore, until up with Dog Island. At this point Felice Strait turns to the **N NW.** and widens out toward Revillagigedo Channel.

**Fish Islet** lies **E.** by **N.**  $\frac{1}{2}$  **N.** 2 miles from Annette Point; it is low and sparsely timbered, and is about 75 yards in diameter.

From Annette Point the eastern shores of Annette Island trend to the northward and westward with moderately high and bold shores, rising rapidly to the high land to the westward.

**Mount Tamgas**, 3,684 feet high, is the most prominent of the many mountains in the vicinity; on its **E.** face toward Cape Fox, is a deep gully or crater of noticeable appearance; the mountain top usually shows more less snow during the entire year.

**Indian Rock** lies  $1\frac{1}{8}$  miles **N NE.**  $\frac{1}{4}$  **E.** from Annette Point; this rock shows at extreme low water and is marked by heavy kelp.

**Bostwick Reef** is 1 mile **NE.**  $\frac{1}{4}$  **E.** from Indian Rock; 9 feet was the least water found on this reef, which is of considerable extent and marked by kelp. To the eastward of these the ground has not been carefully examined, and there may be other reefs.

\* Tamgas Harbor was first surveyed by Etolin, in 1833. A comparison with the survey of 1883 shows most marked differences in the soundings, though the shore lines are approximately the same. There is nothing in the appearance of the surrounding country to indicate that the depths of the inner harbor should have decreased so rapidly.

On the **N.** side of Duke Island is Ponds Bay, separated from Felice Strait by Dog Island; it is a land-locked harbor but somewhat difficult of access, owing to the many islets and reefs which infest its entrance from Felice Strait. The better entrance is from Revillagigedo Channel around Grave Point. There is a high-water passage on the **S.** side of Dog Island, connecting Ponds Bay with Felice Strait.

**N.** of Duke Island are Cat Island and Mary Island, the latter of considerable extent, and between them many islets and reefs.

Mary Island, lying on the **E.** side of the northern entrance to Felice Strait, is about  $4\frac{1}{2}$  miles long **N NW.** and **S SE.**, and about  $2\frac{1}{2}$  miles wide. It is about 200 feet high, with usually low, projecting shores heavily timbered; it is usually bare on the higher part, with occasional clumps of trees. It affords two anchorages, both making a fairly good lee in southerly weather. On the **W.** side of the island are several lakes.

The depths in Felice Strait vary from 113 fathoms at the western entrance to 23 fathoms at Indian Rock, with shoaler water along the shores **N.** of Ajax Reef.

**Tides.**—In the strait the flood tide runs to the eastward and northward, variable in strength with the wind, seldom exceeding 1 to 2 knots. There are usually light tide-rips in the vicinity of the outer entrance to Tamgas Harbor. It is high water, full and change, at Tamgas Harbor at  $0^h 14^m$ , with a mean rise and fall of 13 feet.

#### SAILING DIRECTIONS FOR FELICE STRAIT AND TAMGAS HARBOR.

From Clarence Strait give the **S.** face of Point Davison a berth of  $1\frac{1}{2}$  miles, to clear the outlying reefs off that point, which usually show kelp.

When in position midway between Point Davison and the rocky islets of the Percy group **N.** of Cow Island, which are very bold-to, steer **N.** by **E.**  $\frac{1}{2}$  **E.** which leads in clear of all dangers.

#### TO ENTER TAMGAS HARBOR.

Mule Rock may be passed on either side, with deep water close-to. There is a deep passage on the **W.** side of Grass Rock, but nothing is gained by it, and the shoal off Deer Point necessitates a somewhat short turn.

Keep the eastern shore aboard until past Creek Point, near the village, when it will be necessary to keep away to the westward a little for a course between the shoals off Yellow and Crab points, and for which no natural ranges can be given. At low water the shoals can be easily seen; off Yellow Point the shoal drops suddenly into deep water, while off Crab Point it is more gradual.

A good anchorage may be found with Yellow Point and the Indian village in range, and Crab Point bearing **S SE.**  $\frac{1}{2}$  **E.**, in  $7\frac{1}{2}$  fathoms, or in  $4\frac{1}{2}$  fathoms in the southern part of the harbor with Crab and Tent points in range, and Yellow Point bearing **E NE.**; or an anchorage may be selected in about 6 fathoms in the northern part of the harbor.

If coming from the eastward, haul up around Survey Point, giving it a moderate berth; pass Mule Rock on either side, and proceed as above. There is a very contracted anchorage **E.** of Harris Island.

If going through Felice Strait to the eastward, when Harris Island bears **E.**, a course **NE.** by **E.**  $\frac{1}{2}$  **E.** northerly, with Fish Islet directly ahead, will lead clear of all dangers **N.** of Ajax Reef to Annette Point. Round Annette Point moderately close-to, passing in mid-channel between Snipe Island and the point, and follow the **E.** shore of Annette Island within  $\frac{1}{2}$  mile, to avoid Indian Rock, until the **S.** end of Mary Island bears **NE.** by **E.**  $\frac{1}{2}$  **E.**, when the rock will have been passed. Or, when Snipe Island bears **S.**  $\frac{3}{4}$  **W.**, steer **N.**  $\frac{3}{4}$  **E.**, with the Twin Islands directly ahead;  $2\frac{1}{2}$  miles on this course passes Indian Rock, and a course may be laid as desired.

There is good water **S.** of Ajax Reef and Snipe Island, Tamgas Reef being the only danger on the **S.** side of the strait.

In Clarence Strait, from Point Davison to the **NW.** to Canoe Cove, the coast is rocky and dangerous, with outlying reefs at a distance of nearly 1 mile, but all marked by kelp; the rocky islets are usually bare, with occasionally a scrubby hemlock tree.

Nichols Passage is a wide channel on the **W.** side of Annette Island, and separating it from Gravina Island; it affords a good channel between Clarence Strait and Revillagigedo Channel.

On the **E.** side of Nichols Passage the shore line is much broken by islands and reefs, some of which are nearly in mid channel.

Hid Reef lies nearly 2 miles off shore at the **SE.** side of the entrance to Nichols Passage. This reef shows at low water as three rocks, extending nearly  $\frac{3}{4}$  mile in a **W NW.** direction; at three-quarters flood the two westernmost rocks cover, and the eastern rock is awash at high water; all are marked by kelp, and have moderately deep water close-to. There is a clear passage to the eastward of Hid Reef, but it is not particularly recommended.

Canoe Cove, on Annette Island, **E.** of Hid Reef, affords excellent shelter for boats; it is a stopping place for the Indians when waiting for suitable weather to round Point Davison. The cove is formed by a small group of low, rocky islets at the point where Annette Island turns to the **N.** from Clarence Strait.

About  $3\frac{1}{2}$  miles **N.** by **W.** from Canoe Cove is Cedar Point, and southward of the point is Smuggler Cove, which has a rocky entrance, and is not an anchorage except for very small craft.

From Cedar Point the shore line runs about **N.** for  $1\frac{1}{4}$  miles, then turning to the northeastward for  $\frac{1}{2}$  mile to Village Point. In this distance the coast is low and rocky, with extensive ledges and some outlying rocks usually marked by kelp; at Village Point is a broad sandy beach.

Yellow Hill is, as its name indicates, a marked yellow-topped hill, that can be seen both from Tamgas Harbor and Nichols Passage; it shows irregularly as one or two peaks from different points of view. It is 554 feet high, and lies **NE.**  $\frac{3}{4}$  **E.**  $1\frac{1}{4}$  miles from Cedar Point.

Port Chester is an extensive bay, filled with islets and reefs, and lies to the northward of Village Point. From this point to the bottom of the bay is usually shingle or gravel beach, with ledges extending out a short distance from every projecting point. From the bottom of the bay to the northward the shores are very steep with deep water close to, and but little timber; a mountain stream runs into the bay near its head, coming from the lakes 1,000 feet above; this waterfall is very marked, except in very dry weather, when going through the passage; there is a small ledge at the foot of the fall, worn by the falling water, and which shows at low water.

Copper Point and its vicinity is steep, high, and timbered to the water's edge; traces of silver and copper are found here. In the bight near Copper Point a fine salmon stream empties from Trout Lake, and near its mouth are some Indian houses.

Hemlock Island is low and wooded, and is connected with the mainland at low water by a sand bar.

Driest Point is low, and wooded, and rocky; off this point to the northward and westward is a ledge and sunken rocks marked by kelp.

Port Chester, lying between Driest and Village points, is nearly filled with islets, ledges, and sunken rocks; the islets are low, and, as a rule, more or less wooded, very few showing as bare rocks above high water.

There are three entrance passages into Port Chester, but only the southern one, around Village Point, is recommended, except with local knowledge or at extreme low water, when the dangers are mostly visible.

Hub Rock shows at low water as about 100 feet long by 40 feet wide, and is very nearly awash at extreme high water. It lies 1 mile **N NE.**  $\frac{1}{2}$  **E.** from Village Point.

Martin Rock, which shows only at extreme low water and is not marked by kelp, lies nearly  $\frac{1}{4}$  mile **W NW.** from Hub Rock. Shoal water extends nearly  $\frac{1}{4}$  mile to the **NW.** from Martin Rock.

Newell Rock, with 11 feet over it at low water, and showing no kelp, lies  $\frac{3}{4}$  mile **N.** of Hub Rock.

To the **S SE.** of Hub Rock is the anchorage in from 17 to 24 fathoms.

Scrub Island has two or three straggling trees on it, and near it on all sides are ledges that cover at high water, except one or two detached heads.

Murdo Island is small and wooded; extensive ledges showing small detached heads at high water extend  $\frac{3}{4}$  mile to the westward and to the **SW.** by **W.** for nearly  $\frac{3}{4}$  mile; the latter bare at half tide and are marked by kelp. About  $\frac{1}{2}$  mile **W.** by **S.** from the island is an extensive ledge which bares at half tide and is marked by heavy kelp. On the **N.** and **E.** sides is a shelving sand beach.

Gull Island is small and wooded, and lies nearly  $\frac{1}{4}$  mile **W NW.**  $\frac{3}{4}$  **W.** from Village Point. **E.** by **N.**  $\frac{1}{2}$  **N.** from it an extensive ledge about  $\frac{1}{4}$  mile wide extends nearly  $\frac{3}{4}$  mile; in this ledge is a low, small islet, having on it a few scrubby trees; **SW.**  $\frac{1}{2}$  **W.** from Gull Island about  $\frac{3}{4}$  mile is a small, low, bare rock, and extensive ledges lie between, all marked by kelp. The best entrance to Port Chester is **S.** of Gull Island.

Morse Rock, awash at ordinary low water, lies  $\frac{1}{4}$  mile **S.** of Hemlock Island.

Lively Rock, a dangerous sunken rock, having 8 feet over it at ordinary low water, lies  $\frac{1}{2}$  mile **W.** by **S.**  $\frac{1}{4}$  **S.** from the middle of Hemlock Island; it is marked by a few straggling pieces of kelp. The northern entrance to Port Chester is between Lively Rock and Hemlock Island.

Fillmore Rock, awash at ordinary low water, lies  $\frac{3}{4}$  mile **NW.**  $\frac{1}{4}$  **W.** from Murdo Island.

At the head of the bay is a shoal having 6 fathoms least water; a vessel may anchor on it, though the best anchorage is in 15 to 17 fathoms **NW.** of it.

Warburton Island is round, heavily timbered, and about 200 feet high to tops of trees. It lies 2 miles **NW.**  $\frac{1}{4}$  **W.** from Cedar Point, and is the key to the navigation of Nichols Passage and the entrance to Port Chester.

Kelp Rocks lie  $1\frac{1}{4}$  miles **W NW.**  $\frac{1}{2}$  **N.** of Warburton Island. These rocks are in three patches lying nearly  $\frac{1}{4}$  mile apart, and constitute the greatest danger in navigating the passage. These rocks show at extreme low water and are marked by kelp. There is a clear passage **E.** of the Kelp Rocks and Warburton Island.

**NW.** from Driest Point and close to is a small, low, bare, rocky islet, with some outlying ledges, showing some kelp, and awash at high water; **E.** of this islet is a small anchorage called Sylburn Harbor; nearly in the middle of the outer entrance is a rock, nearly awash at high water, with a sunken rock close to it.

From Driest Point to the northward the shores are steep, with occasional small projecting points, with outlying ledges usually showing kelp.

**Walden Rocks** are a group of bare rocks at the N. entrance to Nichols Passage. The group is irregular, about 250 yards long by 125 yards wide, and showing about 10 feet above high water, at which time the smaller rocks are covered. E. of the group about  $\frac{1}{2}$  mile is a rock that covers at half tide and shows kelp; N. of the group, and close to, are other rocks marked by kelp. NW. by W.  $\frac{3}{4}$  mile from the group is a sunken rock having but 3 feet over it at low water. SE. by E. of the group about  $\frac{1}{2}$  mile are two rocks close together, showing at half tide, and marked by kelp, and close in to the eastern shore, on nearly the same bearing, is another small group of rocks that cover at high water.

**Annette Bay**, on the NW. point of Annette Island, lies NE. from Walden Rocks; its S. point of entrance is marked by a small wooded islet, close in shore, with which it is connected at low water.

**Race Point**, lying  $1\frac{1}{4}$  miles NNW.  $\frac{3}{4}$  W. from Walden Rock, is the N. point of entrance to Annette Bay, and is also the eastern point of the northern entrance to Nichols Passage. It is a long, narrow point, low and wooded.

**Annette Bay** is an inlet,  $\frac{3}{4}$  mile wide at its entrance, and narrowing to a small stream; it is  $3\frac{1}{2}$  miles long. The water is deep, and it does not afford an anchorage.

A ledge of rocks, partly showing at low water, extends for  $\frac{1}{4}$  mile in the prolongation of Race Point.

The N. end of Annette Island is a succession of rugged peaks and mountains from 2,000 to 3,000 feet high. There is undoubtedly copper and probably other minerals in these mountains.

The **Bronaugh Islands** are on the W. side of the S. entrance to Nichols Passage. The islands of this somewhat scattered group are low and wooded, with sunken rocks and ledges surrounding them. They lie from  $\frac{3}{4}$  mile to  $2\frac{1}{4}$  miles off shore. ENE. from the easternmost island, called Point McCarty, is a rock, marked by kelp, and which shows at half tide; at  $\frac{1}{2}$  mile E. of this rock the soundings show 129 fathoms. There is no safe passage inside this group of islands.

**Dall Head**, the southern end of Gravina Island, is the western headland of the southern entrance to Nichols Passage; it is a steep, wooded point, rising rapidly back to the high mountains of Dall Ridge, which, with its high peaks of nearly 3,000 feet, forms a very conspicuous landmark from Clarence Strait and Dixon Entrance; they may be seen in clear weather, in Clarence Strait, far above Point Stanhope, appearing as a high island. There is a small harbor on the N. side of Dall Head, but it does not afford shelter except to boats.

The middle of Gravina Island is a low valley extending NW. and SE., with the high peaks of California Ridge on its eastern side.

From the Bronaugh Islands, along the E. side of Gravina Island to Gravina Point, the coast is somewhat irregular, with two inlets of moderate length.

**Bostwick Inlet**, about  $1\frac{1}{4}$  miles in width at its entrance and  $2\frac{1}{2}$  miles deep, affords no safe anchorage in bad weather.

**Blank Inlet** does not afford an anchorage. Near the middle of this inlet is a rock that covers at three-quarters flood, and is not marked by kelp;  $\frac{1}{2}$  mile NW. by W. from this rock is a shoal, on which  $3\frac{3}{4}$  fathoms was the least water found. About  $\frac{1}{4}$  mile off the S. entrance point of Blank Inlet is a reef, that shows at low water, and is marked by kelp. Blank Islands, at the entrance to the inlet, are two in number; they are irregular in shape, low, and heavily wooded; they lie WSW.  $\frac{1}{2}$  mile from Walden Rocks.

**Gravina Point** is the W. entrance point from the N. into Nichols Passage; it is a broad point facing to the eastward, and is low and wooded, though somewhat open in the interior. Judy Hill, 831 feet high, lying on the S. side of the point, is round topped, and somewhat noticeable when coming from the southward.

#### TIDES IN NICHOLS PASSAGE.

The flood tide runs to the northward about 1 knot an hour, meeting the flood tide from Revillagigedo Channel in the vicinity of the Walden Rocks, depending somewhat on the force and direction of the wind.

#### DIRECTIONS FOR NICHOLS PASSAGE.

From the southward. Pass the Bronaugh Islands to the eastward  $\frac{3}{4}$  mile, to clear the rock off Point McCarty, and keeping a lookout for Hid Reef. With Point McCarty bearing WSW.,  $\frac{3}{4}$  mile distant, a course N. by W.  $\frac{1}{2}$  W. leads clear of Kelp Rocks, through Nichols Passage, until up with Walden Rocks, when a course may be laid as desired, bearing in mind the position of the 3-foot rock lying NW. by W.  $\frac{3}{4}$  mile from Walden Rocks.

If bound into Port Chester, steer to pass  $\frac{1}{4}$  mile to the eastward of Warburton Island; when up with that island, steer for Scrub Island, until the waterfall opens in range with Village Point, then haul around that point and into the harbor. A good anchorage, in 18 to 22 fathoms, is with Village Point bearing E. by N.  $\frac{1}{4}$  N., and Hub Rock NW.  $\frac{1}{4}$  N.

The tidal currents are but little felt in Port Chester; in hard **SE.** gales the squalls (williwaws) come down from Purple and Leadville mountains with most terrific force. The holding ground is good.

#### FROM THE NORTHWARD.

Steer to pass midway between Walden Rocks and Gravina Point, bearing in mind the 3-foot rock previously described; when abreast the rocks a **S.** by **E.**  $\frac{1}{2}$  **E.** course carries clear through Nichols Passage.

To enter Port Chester, the safest channel is to pass **S.** of Warburton Island. When Yellow Hill is well open **S.** of the island, the Kelp Rocks will have been passed when steering the **S.** by **E.**  $\frac{1}{2}$  **E.** course. Haul up for Yellow Hill, pass Warburton Island from  $\frac{1}{4}$  to  $\frac{1}{2}$  mile, then steer for Scrub Island and enter as before.

A shorter and quite safe passage is to the northward of Warburton Island. From a point  $\frac{1}{4}$  mile **WSW.** from Walden Rocks a course **SSE.**  $\frac{1}{4}$  **E.** clears all dangers and passes  $\frac{1}{4}$  mile **E.** of Warburton Island; when that island is in close range, **SW.** by **W.** with the **N.** end of the North Bronaugh, a **NE.** by **E.** course leads in past Village Point,\* when anchor as before.

By the Northern Entrance. Round Driest Point not less than  $\frac{1}{4}$  mile distant; when the middle of Hemlock Island bears **ENE.**  $\frac{1}{2}$  **E.**, steer that as a course until Murdo Island and Yellow Hill are in range, thence an **ESE.** course clears all dangers; when nearly up to Hub Rock haul into the bay and anchor. This channel is not recommended without local knowledge.

The narrow passage between Murdo and Gull Islands should not be attempted except at low water and with local knowledge.

The western coast of Gravina Island, from Bronaugh Islands to South Vallenar Point, is steep and rocky, with bold water, and a few wooded islands lying close in shore.

Vallenar Point is the extreme **NW.** point of Gravina Island; between it and South Vallenar Point is Vallenar Bay; in the bay, **N.** of South Vallenar Point, are three low rocky islets about  $\frac{1}{4}$  mile apart; there is no passage to the southward of them; a mud flat, dry at low water, extends out  $\frac{1}{2}$  mile from the bottom of the bay. This bay affords good shelter for winds drawing up the strait.

**Directions.**—Anchor in about 14 fathoms, with the two southernmost islets in range **SW.** by **W.**, and Guard Islands in range with the high bank forming the **N.** shore of the bay **NW.**  $\frac{1}{4}$  **W.**

Vallenar Point is low and wooded, rising gradually back to the high land of California Ridge. Extending out nearly  $\frac{3}{8}$  mile to the **WNW.** of Vallenar Point is a cluster of wooded islets and rocks that cover at high water; there is no safe passage inside these islets; the outer islet of this cluster, called Vallenar Rock, has deep water close-to, but  $\frac{1}{8}$  mile **SW.** from it is a rock that covers at high water.

Guard Islands lie  $1\frac{1}{8}$  miles **WNW.** from Vallenar Point; they are two in number, lying close together; they are about 25 feet high, and bare, except a few straggling trees and considerable fallen timber. **SE.** of them, and close-to, is a rock showing at low water and marked by kelp. **ESE.** from Guard Islands,  $\frac{3}{8}$  mile, is a large kelp patch, marking a reef, small portions of which show at low water; there is a passage on each side of this reef, but that to the southward,  $\frac{3}{4}$  mile wide, between it and Vallenar Rock, is to be preferred.

The position of Guard Islands is in

Latitude .....	55° 26' 50'' N.
Longitude .....	131° 52' 38'' W.

Variation 28° 28' 5 E., in 1886.

**Tides.**—In this vicinity it is high water, full and change, at 13<sup>h</sup> 00<sup>m</sup>, with a mean rise and fall of 13 feet.

At this point Revillagigedo Channel, through Tongass Narrows, comes into the broad expanse of Clarence Strait and Behm Canal.

#### REVILLAGIGEDO CHANNEL.

This is the easternmost of the great channels extending to the northward from Dixon Entrance, and is the one usually taken in making the inland passage from the waters of the Columbian Archipelago. It extends in a general northwesterly direction from Cape Fox to Guard Islands, a distance of about 54 miles.

From Cape Fox the shore trends nearly **W.** for 3 miles to Boat Harbor Point, thence to the **NW.**  $\frac{1}{2}$  **W.** about 17 miles, to the entrance to the inlet called Boca de Quadra. Close in shore are small islets and rocks, with ledges that cover at high water, and usually marked by kelp. From the shore line the land rises gradually to the summits of the mountains of Peninsula Ridge, and is wooded to the water's edge, with occasional patches of open country. In the vicinity of Cape Fox, on the mainland, are several very noticeable white ledges on the southern and western sides of the mountain.

\*At Village Point were the ruins of an old Indian village, entirely overgrown with trees. The large village of New Metla Katla has been built since the notes for this work were obtained, and it is probable that the local appearance of Village Point and Port Chester are materially changed.



## REVILLAGIGEDO CHANNEL—DESCRIPTION.

About  $2\frac{3}{4}$  miles to the westward of Cape Fox is Boat Harbor (probably the Boat Harbor of Vancouver); it is a small cove forming an excellent shelter for boats, but its entrance is not readily distinguished except when very close-to.

The rock noted on the old charts as lying about 3 miles off this point was searched for carefully; it does not probably exist.

Foggy Point lies  $8\frac{1}{2}$  miles above Boat Harbor Point; this point is a round high-water island, with bluff sides, and wooded. Here the shore turns abruptly to the **E NE.** for about  $\frac{3}{4}$  mile, thence again to the **NW.**, forming Foggy Bay, an open bight that does not afford an anchorage on account of the great depth of water. At the bottom of the bight are two white sand beaches, separated by a dark rocky ledge. There is a kelp patch and some rocks  $\frac{1}{4}$  mile **NW.** from Foggy Point. Here Revillagigedo Channel is  $7\frac{1}{2}$  miles wide.

In Foggy Bay are the De Long Islands. The group is about  $1\frac{1}{4}$  miles above Foggy Point, and with the rocks and ledges that cover at high water, extend parallel to the shore for a distance of 2 miles, and nearly 1 mile off shore. These islands are nearly all connected together, and with the shore, at low water.

Kirk Point, a very nearly high-water island, lies  $4\frac{1}{4}$  miles **NW.** from Foggy Point and  $1\frac{1}{4}$  miles above the De Long Island; it is moderately high and wooded. Off the **NW.** end of Kirk Point a reef extends about  $\frac{3}{4}$  mile; its highest part above water is called House Island, and is wooded. Between Kirk Point and the De Long Islands are numerous rocks and reefs. On the mainland to the northward of Kirk Point is a small Indian village, in which is a conspicuous white double house.

Kah-Shakes Cove is a small harbor  $2\frac{1}{2}$  miles above Kirk Point. It is sheltered by a group of small wooded islands extending out about  $\frac{3}{4}$  mile from the mainland. A small Indian village is located here. The cove is  $\frac{3}{4}$  mile long by about  $\frac{3}{8}$  mile wide, with depths from 4 to 13 fathoms. The entrance to the cove, though straight and carrying 3 fathoms at low water, is only 60 feet wide, with rocks on either side. There is a fine salmon stream entering the cove.

Just **N.** of Kah-Shakes Cove is an inlet, with a good-sized island and some rocks at its entrance, and with rocks inside; a mountain stream comes in at the head of this inlet. No anchorage here.

Black Rock, barren, about 25 feet high above high water, lies  $2\frac{1}{4}$  miles **W.** by **N.** from Kirk Point; it is about 50 yards square and surrounded by kelp. **W SW.**  $\frac{1}{8}$  mile from Black Rock are two rocks covered at high water and showing kelp.

Snail Rock, about  $\frac{1}{2}$  mile **N.**  $\frac{1}{4}$  **W.** from Black Rock, is about 300 yards in length by about 250 in breadth, and about 40 feet above high water; it is bare of trees, and on its top is an Indian vegetable garden. Between Black Rock and Snail Rock is a low reef, portions of which show at low water.

About  $\frac{1}{2}$  mile **E.** from Snail Rock is a kelp patch in which 15 feet was the least water found. There is a clear passage of about 1 mile in width between this kelp patch and the main shore.

White Reef is low, showing only in patches at high water, and probably entirely covered or awash at extreme high water; the reef is nearly 1 mile long **NW.** and **SE.**, and shows very little kelp; at low water several white sand spots show on its top.

Slate Island lies 1 mile **NW.** from White Reef; it is low and wooded; **NW.**  $\frac{1}{2}$  mile from it is a group of wooded islets and some rocks, the whole being nearly connected at low water.

The rocks and islands just described, lying **NW.** from Kirk Point, form a barrier to a deep inlet called Boca de Quadra, which at its entrance is 1 mile wide, and extends in a generally northerly direction about 30 miles, with a width of 1 to 2 miles. This inlet has not yet been examined, but it is known to be deep, with steep shores; there are several islands in it, and numerous mountain streams flow in. It probably contains one or more anchorages.

Between the outside barrier of rocks and islets are several passages; one, about 1 mile wide, is between Black Rock and the mainland, taking care to avoid the kelp patch previously described; not less than 22 fathoms was found in this passage. Another, between Snail Rock and White Reef, is a clear passage about  $1\frac{1}{4}$  miles wide, with not less than 17 fathoms. Between White Reef and Slate Island is also a passage about  $\frac{3}{4}$  mile wide, with not less than 28 fathoms.

From Slate Island to Point Sykes, about 6 miles, the shore trends about **NW.** by **N.**; it is quite irregular, with many small bights and islets, with reefs and rocks lying well in to the shore.

Black Islet, about 3 miles below Point Sykes, is small and wooded, and lies close in shore, but appears when seen from the southward to stand well out.

Point Sykes, the eastern entrance point to Behm Canal, is a steep rocky point, rising somewhat rapidly back to the high mountains; the whole coast is wooded, with occasional patches of open ground.

The West shore of Revillagigedo Channel is made up of many rocks and large and small islands.

The group of rocks lying **S.** of Duke Island have already been described.

Cape Northumberland is the southern extreme of Duke Island; **NE.** of the cape is a deep bight filled with rocks and kelp.

Kelp Island is a large, wooded island lying **NE.** of the cape about  $1\frac{1}{2}$  miles, and is about  $\frac{1}{2}$  mile off shore. About 1 mile **S.** of Kelp Island are the Sister Islands, three in number, and connected at low water; in this vicinity are many rocks and kelp patches.

**East Island** lies  $1\frac{1}{2}$  miles **NE.** by **E.** from Kelp Island, and  $1\frac{1}{2}$  miles off the Duke Island shore; it is low and wooded, with many reefs inside of it and in its vicinity; there is a small wooded islet about  $\frac{1}{2}$  mile **S.** of it. **S.** of East Island  $2\frac{1}{4}$  miles is a reef showing at low water and marked by kelp; this is the outermost known danger between East Island and Club Rocks. Between this reef and Yellow Rocks is a clear passage about 2 miles wide.

**Duke Point**, the eastern point of Duke Island, is a high, projecting, peninsular point, wooded, and about 200 feet high to tops of trees; from the **N.** or **S.** it has the appearance of being a high-water island. **W.** of the point on Duke Island is Duke Hill, 540 feet high, and which from the **NW.** and **SE.** shows as a marked saddle.

From Duke Point to Grave Point,  $5\frac{1}{2}$  miles, are deep bights with projecting points, with rocks and kelp patches between. At Duke Point the land makes an abrupt turn to the **W SW.**, forming a deep bight where a possible lee might be found in a southerly gale, but it is not recommended. At the bottom of this bight is **Morse Cove**, a perfectly land-locked harbor, but with a very narrow entrance, with a rock in the middle of the narrowest part, which prevents its use except for boats.

**Grave Point**, the **N.** point of Duke Island, is low and wooded. **NW.** of it nearly  $\frac{1}{2}$  mile is Cat Island; the passage between the two is nearly closed by a reef projecting out from Cat Island. Close around Grave Point is a narrow channel with 6 fathoms least water, by which Ponds Bay can be entered, but it should not be used without some local knowledge.

**Duck Island** lies  $\frac{1}{2}$  mile **E SE.** from Grave Point and about  $\frac{3}{4}$  mile off shore; it is about  $\frac{1}{2}$  mile long and parallel with the shore; at its southern extremity is a long low point, partially covered at high water, with a high point of rocks at the extreme end. Off the **SW.** side of Duck Island is a small low islet, with a reef making off it about  $\frac{1}{2}$  mile to the southward.

**Anchorage.**—Between Duck Island and this reef on the **E.** side, and Duke Island on the **W.** side, is a very fair anchorage  $\frac{1}{2}$  mile in length and  $\frac{1}{4}$  mile in width, with 7 to 14 fathoms. It is called Reef Harbor. A rocky islet and reef extends  $\frac{3}{4}$  mile **E NE.** from the **N.** end of Duck Island. Reef Harbor is not well protected from the eastward, and it is useful only with local knowledge.

The best entrance to Reef Harbor is around the **N.** end of Duck Island, and it can be approached either from the northward of Whale Rock or to the southward of Little Rock. The eastern shore of Duck Island should not be approached within  $\frac{1}{2}$  mile, and a mid-channel course should be kept between Duck Island and Grave Point, favoring somewhat the Duke Island shore.

Between Duke and Mary islands the channel is much obstructed by islands and reefs. The largest of the islands is Cat Island, which is  $1\frac{1}{2}$  miles in length **N.** and **S.** and  $\frac{1}{2}$  mile greatest width, and wooded. Off its **SE.** point lie three small islets; in the center of the middle one stands a large prominent tree trunk, resembling a "totem."

The channel between these islets and Grave Point is obstructed by reefs, but a ship channel exists close along the **N.** shore of Duke Island; 6 fathoms can be carried through at low water about 250 yards off shore, with deeper water after passing  $\frac{1}{2}$  mile beyond Grave Point.

**Ponds Bay** has its entrance about  $1\frac{1}{2}$  miles **SW.** by **W.** from Grave Point; it is a commodious and safe harbor  $2\frac{1}{2}$  miles in length to the **SSW.** by  $\frac{1}{2}$  mile in width. From a small and probably high-water island at the **NE.** entrance point, a reef extends in a **WSW.** direction  $\frac{3}{4}$  mile, which from inside the harbor appears to close its entrance. The channel is to the westward of this reef and is free from danger; 6 fathoms can be carried through the entrance at low water; when inside the water deepens to 22 fathoms, and at 1 mile from the entrance shoals gradually to 10 fathoms, from whence the soundings are very regular, with soft mud bottom. On the **W.** side of the entrance to Ponds Bay, between Cat and Dog Islands, are the Double Islands and Village Islands, with reefs and rocks between.

**Village Island** is about  $\frac{1}{2}$  mile in length **NE.** and **SW.**, and from 30 to 150 yards in width, with some outlying rocks about 250 yards off the **NW.** side. The island is nearly covered by an Indian village, in which are numerous grotesquely carved "totem poles." On the adjacent point of Cat Island are also some houses.

**Mid Rock**, 25 feet high and 12 feet in diameter, lies midway between Village and the Double islands.

**Lane and Fripo islands** lie between Cat Island and Mary Island; they are each about  $\frac{1}{4}$  mile in diameter, with surrounding ledges, with deep water close to; nearly  $\frac{1}{4}$  mile to the eastward of these islands are several rocks and reefs. The islands are wooded; on Fripo Island is a noticeable tall tree standing far above all others.

Off the **S.** end of Mary Island project numerous rocky islets and reefs. Between Mary Island and Lane Island is Danger Passage, about  $\frac{1}{4}$  mile wide, and leading to Felice Strait.

**Whale Rock** lies **NE.**  $\frac{1}{2}$  **N.**  $2\frac{1}{4}$  miles from Grave Point, and 2 miles **SE.** by **S.** from Mary Island; it is bare, about 15 feet above high water, and has outlying sunken rocks; it uncovers nearly  $\frac{1}{4}$  mile in length.

**Little Rock** lies **SSE.** 1 mile from Whale Rock; it is bare, and about 10 feet above high water. There is no safe passage between these two rocks.

## DANGER PASSAGE—DIRECTIONS.

## DIRECTIONS FOR DANGER PASSAGE.

Pass about  $\frac{1}{4}$  mile to the northward of Lane Island. There are tide swirls near mid-channel, but no dangers were developed by the survey.

**Directions.**—When in mid-channel, in range between Lane Island and Harbor Island (the latter is a small, high-water, wooded island on the S. end of Mary Island), steer for the NW. point of Cat Island, until the N. side of Fripo Island is in range with Little Reef, about ESE., whence a WNW. course carries clear into Felice Strait.

This clears the shoals which lie about 400 yards to the southward of the Nib and Lab reefs and are marked by kelp at half tide. Nib and Lab reefs are bare rocks above water.

The least water found in Danger Passage was 13 fathoms; except for local use it affords no advantages to navigation.

The eastern shore of Mary Island is steep and wooded; there are some outlying rocks and a high-water islet off its southern half; the northern half is steep and bold.

Mary Island affords two anchorages. On its N. end are several shallow bights; in the eastern one a moderate-sized vessel can lie easily in southerly weather.

**Point Winslow**, the NE. point of Mary Island, is low and wooded; on the prolongation of the point is a ledge and reef with kelp extending out about 125 yards. The anchorage is in about 14 fathoms with Point Winslow bearing NE.  $\frac{1}{2}$  E., distant a little more than 1 cable.\*

The other and better anchorage, though a little more out of the way, is on the W. side of the island, to the northward of the projecting point which lies  $1\frac{1}{2}$  miles to the southward of Giant Point. Anchor well inside the point in about 10 to 12 fathoms, muddy bottom, 1 cable distance off shore.

Giant Point is the NW. point of the island, and lies SW. by W. a little more than  $\frac{1}{2}$  mile from Point Winslow. Off Giant Point a ledge and kelp extend nearly 200 yards, and off the entire N. end of the island the shoal water and kelp extend out nearly  $\frac{1}{2}$  mile.

**Twin Islands**, two in number, low and wooded, and lying close together, are 2 miles NW.  $\frac{1}{4}$  W. from Point Winslow, with a deep channel between.

At this point Felice Strait enters Revillagigedo Channel, and the latter again divides into two arms, the eastern one being the southern entrance to Behm Canal, and the western one continuing on until it reaches Clarence Strait at the Guard Islands.

From abreast Mary Island, the N. and E. sides of Annette Island are somewhat broken. The shores are steep and rise gradually to the high ridges running parallel with them. West south-west from Giant Point, a bank having a least depth of 4 fathoms, extends out from Annette Island nearly a mile, the general depth between the Islands being from 30 to 50 fathoms.

**Cascade Inlet**, in Annette Island, lies  $5\frac{1}{2}$  miles W. from Giant Point; it is about 2 miles in length and  $\frac{1}{4}$  mile wide; the water is deep and it affords no anchorage; a narrow boat passage connects the inlet at its head with Revillagigedo Channel and forms Ham Island, a long, narrow, bluff, wooded island, with some ledges off its SE. end. A large mountain stream flows into Cascade Inlet.

At this point the dangerous groups called the **Hog Rocks** extend from the Annette Island shore in an E. by N. direction into the middle of the channel.

WNW.  $\frac{1}{2}$  W. 3 miles from the Twin Islands lies the easternmost of the Hog Rocks. In the groups there are eight principal rocks that show at all ordinary tides, and many smaller ones covered at high water. At low water these rocks resolve themselves into four groups.

The channel between Revillagigedo Island and the easternmost, or fourth group, is about  $1\frac{1}{2}$  miles wide. One mile W. from this group is the third group, with a 19-fathom channel between; and  $\frac{1}{2}$  mile WSW. from this is Walker Island, low and wooded, nearly circular and about  $\frac{1}{4}$  mile in diameter, with a small wooded islet close to its S. side. About  $\frac{1}{4}$  mile W. from Walker Island is the second group of Hog Rocks, and  $\frac{1}{2}$  mile farther to the westward is Lewis Island, low and wooded, and about one third the size of Walker Island, and  $\frac{1}{2}$  mile from Annette Island. Between Lewis and Annette Islands is the first group of Hog Rocks. There are navigable channels between these groups but they save no distance and should not be used without local knowledge.

**Point Alava**, on Revillagigedo Island, lies 3 miles NNW. from Twin Islands; it is not easily distinguished, but is, however, marked by a small wooded islet close in shore, rocky and steep-to.

From Point Alava the western shores of Revillagigedo Island trend to the westward for  $5\frac{1}{2}$  miles to Cone Island; midway between these points is a small group of rocks near the shore, near a prominent projecting point; the shores are steep and rise rapidly back to the mountains.

**Cone Island** marks the eastern point of entrance to Thorne Arm; it is a dome shaped, thickly wooded island,  $\frac{1}{2}$  mile in diameter and about 300 feet high, and lies close to the shore.

**Thorne Arm** is an inlet extending into Revillagigedo Island to the northward about 8 miles. It is about one mile in width for nearly 5 miles, when it expands to the westward, the expanded portion containing numerous wooded islands. A somewhat contracted anchorage can be found in its NW. and NE. corners. On the W. side of the entrance to Thorne Arm is another inlet, with a small islet at its entrance, extending NW. by N. about  $1\frac{1}{2}$  miles; it affords no shelter.

\* A rock with scarcely 3 fathoms over it at low water, lying in close proximity to the anchorage in 16 fathoms, is reported by Captain Hunter of the steamer Mexico. No bearings are given for the accurate location of this danger. A thorough examination has been ordered by the Superintendent of the Coast and Geodetic Survey.

From Lewis Island **W.**  $\frac{1}{2}$  **N.**  $2\frac{1}{4}$  miles is Harbor Point, low, steep, and wooded; here the Annette Island shore makes an abrupt bend to the southward for  $\frac{1}{2}$  mile, and then again to the **W.** by **N.**, inclosing Pow Island, with its reefs and rocks, and forming the very snug, though somewhat contracted anchorage called Hassler Harbor.

**Pow Island** is a low, flat, wooded island, a little more than  $\frac{1}{2}$  mile in diameter. Ledges and shoal water extend off its **N.** side about  $\frac{1}{4}$  mile. On its **W.** side, distant  $\frac{1}{2}$  mile, is a low flat rock showing one or more boulders, and a small patch of grass; at extreme low water it is connected with Pow Island.

A little more than  $\frac{1}{4}$  mile **NW.** by **W.** from the rock is a shoal, a little less than  $\frac{1}{2}$  mile in diameter, and having 10 feet least water, with a  $5\frac{1}{2}$  fathom channel between it and the rock, which is surrounded by shoal water for a distance of 150 yards. There are steep sand banks on the **S.** and **W.** sides of Pow Island extending out from 50 to 100 yards.

**Entrance Rock**, with 9 feet of water on it, lies 320 yards **WSW.**  $\frac{3}{4}$  **W.** from Harbor Point, on the **W.** side of the eastern entrance to Hassler Harbor; it is not usually marked by kelp.

**Channel Rock**, awash at ordinary low water, is on the eastern side of the entrance, and lies  $\frac{1}{4}$  mile **SW.** by **S.** from Harbor Point; **E.** of a line between the point and the rock is shoal water. At the rock the channel between the three fathom lines is but 100 yards in width; the rock is not usually marked by kelp.

**Hassler Harbor** lies **SE.** of Pow Island, and is about  $\frac{1}{2}$  mile in extent, with from 6 to 8 fathoms, sandy bottom; in the eastern entrance, at Channel Rock, there is a depth of but  $3\frac{1}{4}$  fathoms. At the head of the harbor is a moderately deep bight, into which a small stream flows; shoal water extends some distance out, but it is steep-to at low water.

The anchorage is in 7 fathoms, with the middle of Pow Island bearing **W.** by **N.**  $\frac{1}{2}$  **N.**

The western entrance is to the westward of the 10-foot shoal and to the southward of Pow Island; with local knowledge the channel **E.** of the 10-foot shoal might be used. The western entrance is about 200 yards wide, narrowing to half that distance when **S.** of Pow Island, with not less than 10 fathoms, though a little shoaler water exists to the westward of the flat boulder rock.

A more commodious anchorage than Hassler Harbor will be found  $\frac{1}{4}$  mile **W.** of the flat boulder island, in  $6\frac{1}{4}$  fathoms, with that island in range with the middle of Pow Island.

The Annette Island shores of Hassler Harbor are low and wooded, and much broken by shallow indentations, the low-water line extending well out from shore, with usually steep banks. West of the harbor the land rises rapidly back to the mountains.

About 1 mile westward of Pow Island are two cascades about 50 feet apart, conspicuous from the channel. Half a mile beyond the cascades is a shallow bight lying to the southward of a short and narrow projecting point.

Anchorage may be had off the cascades in about 19 fathoms  $\frac{1}{4}$  mile off shore.

**Reef Point**, on Annette Island, lies **W.** by **N.**  $\frac{1}{2}$  **N.**  $2\frac{1}{4}$  miles from Harbor Point; off the point two islets and some rocks extend in an easterly direction about  $\frac{1}{2}$  mile. Immediately **S.** of Reef Point is a double bight, or two parallel nearly equal bights, separated by a sharp projecting point, from which a long narrow reef, which mostly dries at low water, extends nearly  $\frac{1}{2}$  mile to a small, nearly bare, rocky islet. Each of the bights has a beach at its head, and in the northern one are some houses.

From Reef Point to Race Point the shore for  $3\frac{1}{4}$  miles takes an irregular **W.** by **N.** direction, being low and wooded.

About  $1\frac{1}{4}$  miles **W.** by **N.** from Reef Point and less than  $\frac{1}{4}$  mile off shore is Spire Island, with a small islet close-to on the **NE.** side; a reef with projecting high-water heads extends  $\frac{1}{4}$  mile **N.** by **E.** from Spire Island, and on its **W.** side for  $\frac{1}{4}$  mile is also a reef which covers at high water; both reefs usually show kelp.

There is a good channel with 24 fathoms inside Spire Island, though it is not in common use.

The **N.** shore of Revillagigedo Channel from Thorne Arm to Carroll Point shows several shallow bights with islands close inshore; the banks are somewhat steep, rising rapidly back to the Black Mountains, nearly 2,000 feet high. Here Revillagigedo Channel is divided by Bold Island, a somewhat high, wooded island about  $2\frac{1}{4}$  miles long **E.** by **S.** and **W.** by **N.**, and nearly 1 mile in greatest width; on the **E.** end of the island is a round-topped hill 349 feet high, and near the middle of the island is a good sized lake.

There is a passage on either side of Bold Island; that to the southward is always used. The **N.** side passage is obstructed by a group of rocks and reefs making out to the eastward from the **E.** end of the island nearly  $\frac{3}{4}$  mile; also by Round Island, which is steep-to, lying  $\frac{1}{2}$  mile **NE.** from Bold Island; but the main obstruction is **Mystic Rock**, a sunken rock nearly in mid-channel nearly  $\frac{1}{4}$  mile **WNW.**  $\frac{1}{4}$  **W.** from Round Island; it is nearly awash at extreme low water and shows no kelp. There is a clear passage on either side of Round Island and also on the **S.** side of **Mastic Rock**. No distance is saved by going to the northward of Bold Island, though it does not so appear when coming from the westward.

There is a small wooded islet about  $\frac{1}{2}$  mile off the **W.** end of Bold Island, and to the southward of Carroll Point are several wooded islets about  $\frac{1}{4}$  mile off shore.

West of Carroll Point are two inlets extending to the northward into Revillagigedo Island. The eastern inlet, called Carroll Channel, is said to connect by a short portage with an inlet coming in from Behm Canal; the western inlet, called George Arm, extends about 15 miles to the northward; neither of these inlets have been surveyed, and they are of no particular importance.

**California Head**, a bluff, bold, wooded point, separates these two inlets, the entrance to which is the broad expanse of water between Carroll and Mountain Points.

**Mountain Point** lies  $3\frac{1}{2}$  miles **W.**  $\frac{1}{2}$  **N.** from the **W.** end of Bold Island and 1 mile **NE.**  $\frac{3}{4}$  **N.** from Race Point; it is a low, rocky, wooded point, rising rapidly to the mountains to the westward; it is quite bold-to.

**Cutter Rocks**, two in number, quite close together, lie  $\frac{5}{8}$  mile **E.** by **N.** from Mountain Point; they are awash at high water, and are marked by kelp. There is a clear passage between Cutter Rocks and Mountain Point.

At this point Revillagigedo Channel is but a mile in width, and is here met by the waters of Nichols Passage; the continuation of the channel to the westward has received the name of Tongass Narrows, the eastern entrance to which is between Gravina and Mountain Points.

**Tongass Narrows** extends in a general **W.** by **N.**  $\frac{1}{2}$  **N.** direction for about 14 miles to Clarence Strait. At its eastern end is **Pennock Island**, about 3 miles in length **E.** and **W.**, and from  $\frac{1}{4}$  to  $\frac{5}{8}$  mile in width; it is rather low and wooded and its **S.** shore is steep.

There is a passage on either side of Pennock Island; that on the **N.** side is obstructed at its eastern end by **California Rock**, lying about in mid-channel, and having 9 feet over it at low water; the rock is  $\frac{1}{2}$  mile **W NW.**  $\frac{3}{4}$  **N.** from the **E.** end of Pennock Island; there is a channel on either side of this rock, the rock itself being now marked by a red and black horizontal striped spar buoy, placed 100 feet **E NE.** from the rock. Usually no kelp is seen over this rock.

The channel on the **N.** side is again contracted by a rock, having 15 feet on it at low water and marked by kelp, lying 200 yards **SW.** of the projecting point of Revillagigedo Island abreast California Rock; the channel between these rocks is about 150 yards wide, and the channel **S.** of California Rock is 300 yards in width. The shores of the passage on the **N.** side of Pennock Island are free from dangers except the rocks mentioned.

Off the middle of the **E.** end of Pennock Island,  $\frac{1}{8}$  mile off shore, is a rock that uncovers at low water and is not marked by kelp; and off the **SE.** extreme of the island a ledge extends nearly  $\frac{1}{8}$  mile;  $\frac{1}{4}$  mile **W.** of this point, and  $\frac{1}{8}$  mile off shore is another rock which shows at low water. These rocks are not in the way of navigation, and with these exceptions the passage on the **S.** side of the island is clear, and though narrow is the preferable channel.

At its narrowest part this **S.** channel is narrowed to a little more than  $\frac{1}{8}$  mile by shoal water on the Gravina Island side; a course a little to the northward of mid-channel carries clear.

Off the **W.** end of Pennock Island are two small wooded islets, and extending about  $\frac{3}{8}$  mile **W NW.** of these is a kelp patch with rocks that show at low water. Off the projecting **W.** end of Pennock Island a ledge that uncovers at low water extends out about 200 yards. **NE.**  $\frac{1}{2}$  **N.** from this point Fish Creek enters the **N.** side passage, from Revillagigedo Island, with extensive sand and mud flats, showing at low water. At the mouth of Fish Creek is a salmon cannery and a small Indian village; a vessel may anchor off the cannery.

**Bar Point**, on Revillagigedo Island, lies  $1\frac{1}{4}$  miles from the mouth of Fish Creek; off the point a ledge and mud flat extends out  $\frac{1}{4}$  mile, and appears from the **N.** side channel, at low water, as nearly closing the channel. This ledge and flat extends along the **N.** shore something more than a mile, but at a less distance into the channel. Thence to Ward Cove the **N.** shore is quite bold-to.

On the **S.** shore,  $1\frac{1}{4}$  miles **W.**  $\frac{1}{2}$  **S.** from the **W.** end of Pennock Island, is a small high-water islet called by the pilots East Clump; thence to Lewis Point,  $2\frac{3}{4}$  miles, ledges and shoal water extend off shore from 50 to 150 yards; the ledges show at low water. About  $\frac{5}{8}$  mile westward of East Clump the width of Tongass Narrows is but  $\frac{1}{4}$  mile, the shoal water on the **N.** side extending out 300 yards from high-water mark; in mid-channel the depth is from 15 to 26 fathoms.

The **N.** shore of Tongass Narrows is steep and heavily wooded, rising rapidly back to the high mountains. The **S.** shores are low, flat, and wooded, with occasional open ground for from 1 to 2 miles back, when the land rises to the California Ridge.

**Peninsula Point**, on the **N.** shore, about 4 miles **W.** of Pennock Island, is the eastern entrance point to Ward Cove; it is a small, low, wooded islet, close to shore, and connected at its western end by a gravel beach to the mainland.

**Ward Cove**, a most excellent anchorage, is a bight extending to the northward about a mile, about  $\frac{3}{8}$  mile in width at the entrance, and widening somewhat inside. The anchorage ground is somewhat obstructed by Bolles Ledge, a sunken reef lying about  $\frac{1}{4}$  mile from the head of the bay, and 300 yards from the eastern shore. At the head of the bay a mud flat extends out about  $\frac{1}{8}$  mile, through which a small stream comes in from a large lake nearly a mile back. The shores of the bay are steep and wooded. During winter gales the willi-waws come down off the mountains with great force. The anchorage is in about 12 fathoms, on the **W.** side of the bay, on the line between a marked dead tree on the **E.** shore and the **N.** point of a small bight near the middle of the **W.** shore. It is high water, full and change, at Ward Cove at 12<sup>h</sup> 09<sup>m</sup>, with 15 feet mean rise and fall.

West of Ward Cove, and near the **N.** side of the narrows, is a group of islands, all more or less wooded; the southernmost one, called Channel Island, lies nearly in mid-channel and has a good passage on either side; it is surrounded by a narrow ledge showing at low water, but may be passed close-to.

Here the width of Tongass Narrows increases to a mile. On the **S.** shore,  $1\frac{3}{4}$  miles from Channel Island, the land forms a moderately deep bight, affording an indifferent anchorage; with the close proximity of Ward Cove it is not used. The western point of this bight is a low, bare rock, connected with the shore, but showing at high water nearly  $\frac{1}{4}$  mile off shore; the bottom of the bight is a sand beach, and the eastern part is shoal for nearly  $\frac{1}{4}$  mile off shore.

Vallenar Point is  $1\frac{1}{8}$  miles **W.** of this bight. The **N.** shore of the narrows **W.** from Ward Cove is somewhat irregular, steep, and wooded.

Refuge Cove, affording shelter only for boats, lies  $\frac{1}{4}$  mile **W.** of Ward Cove; it has an entrance on each side of the group of islets which face it.

Pond Reef lies a little more than  $\frac{1}{8}$  mile off shore, and  $3\frac{1}{8}$  miles **NW.** by **W.**  $\frac{1}{2}$  **W.** from Channel Island; it uncovers at half tide and is usually marked by kelp.

Point Higgins lies 1 mile **WNW.** from Pond Reef, and  $1\frac{1}{8}$  miles **N.**  $\frac{1}{2}$  **W.** from Vallenar Point; it is a low, but steep and rocky point, and, rounding to the **NW.**, forms the **N.** point of the western entrance to Tongass Narrows.

Guard Islands, lying  $1\frac{3}{4}$  miles **SW.**  $\frac{1}{2}$  **W.** from Point Higgins have already been described on page 35; 200 yards **NW.**  $\frac{1}{4}$  **N.** from the Guard Islands is a 3-fathom patch not noted in the previous description.

At Guard Islands, Tongass Narrows debouch into the broad waters of Clarence Strait and Behm Canal.

#### TIDES IN REVILLAGIGEDO CHANNEL.

From Cape Fox the flood tide sets to the northwestward, following generally the direction of the channel, with a variable force, influenced by the the wind, of from 1 to 3 knots; at the Twin Islands it receives the northern flow from Felice Strait, and a slight set across the channel is sometimes experienced, due to the movement of the flood into Behm Canal. The northerly set of the flood through Nichols Passage is about 1 knot per hour, and is diverted to the westward through Tongass Narrows; in the narrows the tidal current is sometimes as great as 4 knots an hour, but usually from 1 to 2 knots; the flood tide from Clarence Strait sometimes backs up into the narrows as far as Channel Island.

In the vicinity of Mountain Point the ebb tide, coming out from George Arm and Carroll Channel, divides, passing to the eastward along Bold Island, and down Revillagigedo Channel and Felice Strait, and to the southward through Nichols Passage. The ebb flows both ways in Tongass Narrows, separating usually in the vicinity of East Clump; to the eastward it flows into Nichols Passage.

#### SAILING DIRECTIONS.

**Revillagigedo Channel and Tongass Narrows.**—In Chatham Sound the usual course, if bound to the northward, is to the westward of Green Islands.\* On this course, with Whitly Point† bearing **WSW.** 1 mile distant, a course **NW.** by **W.**  $\frac{3}{4}$  **W.** leads into Revillagigedo Channel, passing 1 mile off Boat Harbor Point. About  $13\frac{1}{2}$  miles on this course, or until the island of Cape Fox closes in on the mainland, carries clear, whence a **NW.**  $\frac{3}{8}$  **W.** course for  $21\frac{1}{2}$  miles will bring the Twin Islands,  $\frac{1}{2}$  mile on the port beam, **SW.**  $\frac{3}{8}$  **S.** The tides, flowing from 1 to 3 knots from and to Dixon Entrance, may somewhat affect these courses and distances, particularly with strong winds, and care should accordingly be taken.

From the Twin Islands a course **WNW.**  $\frac{1}{2}$  **W.**  $3\frac{1}{2}$  miles, or until the **E.** point of Ham Island bears **SSW.**  $\frac{1}{2}$  **W.**, leads  $\frac{3}{8}$  mile to the northward and just past the outer Hog Rock. Thence steer **W.** until Angle Point, the **S.** projecting bold point of Bold Island is abeam, passing Bold Island close-to, and change course to **W.** by **N.**  $\frac{1}{4}$  **N.**, which at 3 miles brings the reef **N.** of Spire Island about  $\frac{1}{4}$  mile on the port beam.

If desiring to go to the southward of Spire Island, stand across from Angle Point a little to the northward of Reef Point; keep a mid-channel course through and haul up for Mountain Point when  $\frac{1}{2}$  mile past the island.

The passage on the **N.** side of Bold Island may be used, but it saves no distance. Pass Round Island close-to on either side, preferably to the southward; Mastic Rock bears **NW.** by **N.**  $\frac{3}{4}$  **N.**  $\frac{3}{8}$  mile from the island. Follow close to Bold Island, until past a round projecting point of the island, about a mile from Round Island, whence take a mid-channel course; when the small islet **W.** of Bold Island bears **S.**, a course **WSW.**  $\frac{3}{4}$  **W.** clears the Cutter Rocks, and when Tongass Narrows open, enter as desired.

\* See page 68.

† Whitly Point, the extreme northern point of Dundas Island, is not particularly described by the British authorities; at the point is a small wooded islet lying close inshore, and about  $\frac{1}{2}$  mile **SSE.** from it, on the island, is the flat topped Mount Dundas, sometimes called Table Mountain.

## BEHM CANAL.

From  $\frac{1}{4}$  mile **N.** of Spire Island reef a **W.** course leads into the eastern entrance to Tongass Narrows, whence a course may be laid to pass either side of Pennock Island, or into Nichols Passage,\* as desired.

## I.—BY THE NORTH SIDE OF PENNOCK ISLAND.

After passing Mountain Point, haul in for the middle of the passage, steering for the buoy on California Rock;† pass it about 100 yards on either side; it is laid 100 feet **E NE.** from the rock; from thence keep a mid-channel course, favoring the Pennock Island shore at Fish Creek.

A vessel may anchor anywhere in this reach in from 15 to 22 fathoms; the tidal current is not strong.

From a point in mid-channel **N.** of the **W.** end of Pennock Island, steer **W SW.  $\frac{1}{2}$  W.** for a small, high-water island, called by the pilots East Clump, until Channel Island appears in apparent mid-channel; this course leads clear of Pennock Island reef and the shoal off Bar Point, and a mid-channel course to Channel Island is clear of all dangers. Pass Channel Island close to on either side, the southern side is usually taken, and continue mid-channel until Guard Island bears **S.**, whence a course may be laid as desired.

## TO ANCHOR IN WARD COVE.

When Peninsula Point bears **NE.** haul up for a mid-channel entrance; the shores are bold and steep-to. Steer for the **W.** side of the mouth of the creek, and when in line with a marked dead tree on the **E.** shore, and the **N.** point of a bight in the middle of the **W.** shore, anchor in about 12 fathoms. This will be at about one-third the distance across from the **W.** shore, and Bolles Ledge will be nearly in line with the dead tree. An anchorage further out may be taken if desirable. There is room in Ward Cove for three or four moderate-sized vessels.

The range of East Island, a little open of the **W.** shore, **SW.** by **S.  $\frac{1}{4}$  S.**, passes over Bolles Ledge.

## II.—BY THE SOUTH SIDE OF PENNOCK ISLAND.

When up with Mountain Point, steer to pass  $\frac{1}{2}$  mile **SE.** of Pennock Island; when Channel Island is seen in apparent mid-channel, a mid-channel course carries entirely through, clearing all dangers; at its narrowest part it is well to favor the Pennock Island shore.

The Guard Islands are the key to the western entrance to Tongass Narrows, and from there a course may be laid as desired.

## BEHM CANAL.

## POINT SYKES TO BURROUGHS BAY.

Point Alava is the western point of the southern entrance to Behm Canal; the point lies **W SW  $\frac{1}{2}$  W.**  $3\frac{1}{2}$  miles from Point Sykes, the eastern entrance point, and **NW.** by **N.** 5 miles from Point Winslow, on Mary Island. At Point Sykes Behm Canal is 2 miles wide.

Behm Canal, named and explored by Vancouver, is one of the most extensive of the remarkable passages characteristic of this coast. With the Revillagigedo Channel on the **S.**, it entirely encircles the large island called Revillagigedo. It has not been surveyed, and can therefore only be described from Vancouver, and such later information as has been obtained. Its entire length has been traversed by the U. S. S. *Pinta* and by the steamers of the Pacific Coast S. S. Company plying to Alaska.

In the absence of proper surveys no better description can be had than the report of Lieutenant Commander J. S. Newell, U. S. N., commanding the U. S. S. *Pinta*, made in 1887.‡

The *Pinta* entered the canal at its southern end, and Lieutenant Commander Newell says: "I found the channel clear, and with no visible outlying rocks or islands. The islands and rocks, which are few in number, are mostly very near the shores, except New Eddystone Rock, which is in mid-channel.

The direction of the canal from the entrance between Point Sykes and Point Alava is about **N NW.** 14 miles to Point Nelson.

Rudyerd Island, about  $2\frac{1}{2}$  miles long **N NW.** and **S SE.**, is much nearer the shores of Revillagigedo Island, and more to the westward of mid-channel, than shown on the chart or sketch. Off the eastern side of this island are several rocks visible at half tide, but close to the shore.

Smeaton Island, about  $3\frac{1}{2}$  miles long, extends in a **NW.** and **SE.** direction, with a small wooded island off its **SE.** end, and a short inlet making into Revillagigedo Island off its **NW.** end. A sunken rock is reported by Mr. A. Miller, who has gone over these waters a number of times in a steam launch, to exist off the small island at the **SE.** end of Smeaton Island, and about 300 yards to the eastward of it. The **S.** and **W.** shores of Smeaton Island appear to be steep-to.

\* For navigation of Nichols Passage see page 94.

† This buoy, like all others in SE. Alaska, is inspected but once a year, and is, therefore, liable to derangement.

‡ Complete directions for navigating Behm Canal will shortly be issued from surveys by Coast and Geodetic Survey party in 1891.



New Eddystone Rock, Behn Canal.  
(from Vancouver in 1781)



The chart and sketch would lead one to expect to see New Eddystone Rock and Winstanley Island between Revillagigedo Island and Smeaton Island, from between Point Sykes and Point Nelson; but such is not the case, as Smeaton Island is separated from Revillagigedo Island by a narrow channel, about  $\frac{1}{4}$  mile wide, the narrowest part being between Revillagigedo Island and an islet off a well-defined point on the NW. end of Smeaton Island. At this point, in mid-channel, no bottom was obtained in 50 fathoms. This passage through is not visible until nearly abreast the NW. end of Smeaton Island.

Winstanley and Candle Islands, close to the eastern shore of the canal, are completely hidden by Smeaton Island until their ends (NW. and SE.) are reached; they extend about 7 miles in a north-westerly and southeasterly direction. Off the NW. end of Winstanley Island is a small, well-wooded island.

New Eddystone Rock, easily distinguished, rises from a sand-spit in the center of the canal, and is plainly seen as soon as Smeaton Island is passed. At low water this sand-spit dries in all directions from the rock for several cables, and to the northward and westward small boulders extend 2 or 3 cables. To the N. of New Eddystone Rock are three small wooded islands close to the eastern shore of the canal.

There is apparently a clear passage in mid-channel on either side of the rock; that to the eastward is said to be the shallower. One of the mail steamers that has passed through the canal took the eastern channel and reports no dangers; the western channel is nearly 2 miles in width, and in mid-channel no bottom was found with the hand lead in 13 fathoms, and there were no visible dangers.

To the northward of New Eddystone Rock the canal is apparently free from dangers; a few islands scattered between New Eddystone Point and Point Whaley are close to the shore, much closer than the chart or sketch shows, and the shores have every appearance of being steep-to.

Tide-rips were met between the S. end of Smeaton Island and the N. end of Rudyerd Island, but no strong or irregular currents were experienced.

Upon approaching New Eddystone Rock the water became much lighter in color, and to the north-westward of Point New Eddystone was very light, evidently due to glacial streams.

At a point above Rudyerd Bay, in mid-channel, no bottom was found in 123 fathoms. The well-defined cross shape of Point Fitzgibbon, as shown on the chart and sketch, was not observed."

Burroughs Bay is at the extreme northern angle of the canal, where it turns abruptly to the southward and westward toward Clarence Strait.

Between Point Sykes and Point Fitzgibbon on the eastern shore are several bays not visited nor described by Lieutenant Commander Newell.

About 8 miles from Point Sykes is a deep inlet called Smeaton Bay, which penetrates the mainland, curving to the northward for about 10 miles. Vancouver found it to be about  $\frac{3}{4}$  mile wide, with a bay or cove on its eastern shore that approaches within about 2 miles of the head of Boca de Quadra. The entire country is mountainous, with snow-covered peaks and probably glaciers in the interior, of which nothing definite is known.

Point New Eddystone forms the southern entrance point of another inlet called Rudyerd Bay. The inlet appears to be T-shaped, about  $\frac{3}{4}$  mile wide and about 8 miles in extent, penetrating to the N. and E. between high, barren, snowy mountains. Opposite this point is an unexplored opening on the shore of Revillagigedo Island, which is said to connect by a short portage with Carroll Inlet, which enters the island from Revillagigedo Channel.

Walker Cove, a small inlet having a width of about  $\frac{1}{2}$  mile and a length of about 6 miles in a general northeasterly direction, lies about 8 miles above Rudyerd Bay. In this vicinity the chart gives a number of small islands, but as they are not noted by Lieutenant Commander Newell, it is probable that they lie close inshore.

There are numerous other shallow bights that are not described, and on the W. shore of Revillagigedo Island are several unexplored openings.

Burroughs Bay is an inlet about 2 miles wide, and about 5 miles deep in a northerly direction; its shores are somewhat indented by small coves, and at its head are two arms, into each of which comes a turbulent, shallow stream, forming at the head of the bay a broad mud flat. The westernmost stream is called the Unak River. Placer mines have been worked on this river, but not to any great extent. These streams come from glaciers, and the waters of the bay are much discolored and almost fresh.

The Unak River is described as extending about N., true, for nearly 100 miles, and therefore has its source in British territory; canoes and flat-bottom boats can ascend the river about 70 miles, the current is very swift. The valley of the river is about 4 miles wide, and covered with fine spruce. It is said that the Indians in the vicinity are not skillful boatmen in swift water.

A salmon fishery has been established at Burroughs Bay; it is on the eastern shore of the bay, about  $4\frac{1}{2}$  miles above Point Fitzgibbon; the only anchorage known in that vicinity is in an indentation of the coast just S. of the one where the fishery is located; there is no anchorage off the fishery.

## BEHM CANAL—SAILING DIRECTIONS.

## SAILING DIRECTIONS FOR BEHM CANAL.

Furnished by Lieutenant Commander Newell; as follows:

"From a point midway between Point Sykes and Point Alava, a mid-channel course (about **NNE.**), steering for a small island off the **SE.** end of Smeaton Island, carries clear. When the **N.** end of Rudyerd Island is abeam, steer to pass midway between that island and Smeaton Island, following the latter island until the channel between it and Revillagigedo Island opens, whence a mid-channel course goes clear. In passing through this channel, Winstanley Island is seen ahead, and upon clearing the passage, New Eddystone Rock comes in view in mid-channel.

Continue a mid-channel course, steering for New Eddystone Rock, until up with the northwestern end of Winstanley Island; then pass to the westward of the rock, between it and Revillagigedo Island, rounding the rock in mid-channel; thence follow a mid-channel course to Point Fitzgibbon.

## TO ANCHOR IN BURROUGHS BAY.

Enter and stand up the bay in mid-channel. When up with the anchorage bight, which is next **S.** of the one where the fishery is located, head for the middle of the indentation until its **S.** point shuts out all points to the southward, and the **N.** point shuts out the fishery, when anchorage will be had in 20 fathoms, mud bottom, within 1 cable of the beach. Off the **N.** point of this anchorage are rocks within 20 yards of the beach. At the head of the inlet, between the arms, is an Indian house.

A mid-channel course in Behm Canal, from Burroughs Bay to Clarence Strait, is said to be free from dangers."

Point Whaley, the **N.** point of Revillagigedo Island, lies opposite the mouth of Burroughs Bay, and 1 mile **S.** of Point Fitzgibbon. At this point Behm Canal makes nearly a right angle in its course turning to the southwestward and to the southward to its junction with Clarence Strait.

Point Caamano, in Clarence Strait, lies  $4\frac{1}{2}$  miles **W.** by **N.**  $\frac{1}{4}$  **N.** from Guard Islands; it is the southern point of Cleveland Peninsula, separating Clarence Strait from Behm Canal; it is a steep, craggy point, rising rapidly to the high mountains of the peninsula. The point is about 1 mile across its face, with a projecting middle point; off the points, extending nearly  $\frac{1}{2}$  mile, are several small, rocky islets and kelp reefs, which partially uncover at low water. The entire peninsula is heavily wooded.

## BEHM CANAL—POINT CAAMANO TO BURROUGHS BAY.

From its northern entrance between Point Caamano and Point Higgins, Behm Canal extends in a general northerly direction for about 38 miles to Burroughs Bay, where it bends sharply to the **SE.** and **S.**

The canal has been surveyed for only about 10 miles from Point Caamano; for the remainder we have only the imperfect map left by Vancouver.

Lieutenant Commander Newell notes, in his description of Behm Canal: "The northern arm of Behm Canal is apparently clear, but is much narrower than heretofore described, being less than  $\frac{1}{2}$  mile at the **S.** end of Bell Island; the channel on the **N.** side of Bell Island is reported to be shallow off the **N.** end of the island. There are numerous fine looking bays and arms, with well wooded shores, in this part of Behm Canal; the western part of Revillagigedo Island, opposite McDonald Bay,\* is said to consist of many islands with clear navigable channels between."

The surveyed portion of the canal **N.** from Point Higgins and Point Caamano extends about 10 miles.

Point Higgins is not particularly distinguished in passing; it is rather low and rocky with a narrow fringe of ledges and kelp; it is wooded, and the land rises rapidly back to the mountains. At Point Higgins the shore turns to the **N.** by **W.** for about  $1\frac{3}{4}$  miles, then to the **N.** by **E.**  $\frac{1}{2}$  **E.**, where for 8 miles it is fringed by large islands, with deep navigable channels between.

Betton Island is the largest of these islands; it is  $3\frac{1}{4}$  miles long **N.** and **S.**, and nearly 2 miles in width; it is high and steep, and heavily wooded. Off its western side is a group of a dozen or more small wooded islets and bare rocks, called Tatoosh Islands; the westernmost one, a bare rock, appears to stand much farther off shore than is really the case; there is deep water close to them to the westward.

Between the **S.** end of Betton Island and Revillagigedo Island are two good-sized islands, with a deep, clear passage of  $\frac{3}{4}$  mile between them; there is also a channel **E.** of the easternmost island; this island at high water appears as a compact group.

Hump and Back islands, high and wooded, lie close to off the **N.** end of Betton Island.

Giant Island, the next in size to Betton Island, lies  $1\frac{1}{2}$  miles **NNW.** from that island, with a channel nearly 1 mile wide between it and Hump and Back islands.

Joe Island, lying between Giant and Revillagigedo islands, has a deep though narrow channel on each side and is without outlying dangers.

\* Locally known as Yes Bay.

A group of three good-sized islands and three smaller ones, lying **N NE.** from Giant Island, guard the entrance to Moser Bay, and separate it from Naha Bay to the northward.

**Moser Bay** affords a good ship anchorage. At the head of the bay are two islets with a mud flat extending outside them; the anchorage is in 20 fathoms, muddy bottom, abreast a white patch in a cliff on the **S.** shore,  $\frac{1}{4}$  mile from the outermost islet, near the head of the bay. There are good clear passages between the islands that guard the entrance to Moser Bay.

**Naha Bay** lies  $11\frac{1}{2}$  miles **N NE.  $\frac{1}{2}$  E.** from Point Caamano; near the head of the bay is a village to which the post office authorities have given the name of Loring; a salmon fishing establishment is also located here.

**Cache Island**, a small, round, wooded islet, lies near the middle of the bay; there is a good deep channel on either side of this island, which is steep-to. The usual anchorage is in from 17 to 20 fathoms, about 1 cable off shore, with the store bearing about **N NW.** Ledges make out a short distance off the points between which the village is situated, and the bight to the eastward of the village is dry at low water. Vessels of moderate size will find a better anchorage to the eastward of the high water island at the entrance to the inner harbor, but it has not turning room enough to get under way if heading to the eastward. The waters of a large lake flow into the inner harbor, and myriads of salmon resort there during the season. Ledges make out from the shores off the "store," and it should not be approached nearer than  $\frac{1}{2}$  cable.

**Indian Point**, a high, wooded point, marked by several Indian graves, lies **NW.  $\frac{3}{4}$  N.,**  $1\frac{1}{2}$  miles from Cache Island; the land in this vicinity is mountainous and heavily timbered.

Between Betton Island and Point Higgins is the entrance to what is called the Clover Passage to Naha Bay. This passage has no dangers to navigation not shown on the chart (No. 709), and a mid-channel course carries deep water to the anchorage at Naha Bay.

From Indian Point the survey has been continued  $4\frac{1}{4}$  miles to the **N NW.** to Traitors Cove of Vancouver. No description of this inlet is given; its entrance, less than  $\frac{1}{4}$  mile wide, is obstructed by a group of islets and rocks.

The **W.** shore of Behm Canal, as far as surveyed, presents a rugged and broken appearance, with many shallow and some deep bights.

**Helm Bay**, the entrance to which lies  $5\frac{1}{2}$  miles above Point Caamano, extends 5 miles to the **W NW.** into Cleveland Peninsula. There is a group of islands near the center of the bay; the water is deep and the survey indicates no anchorage.

**Trunk Island**, small, and lying close in shore, is the **N.** entrance point to Helm Bay.

Point Francis is 5 miles **N.** of Trunk Island; it is a prominent projecting point forming the **S.** point of entrance to Port Stewart, the **N.** point of entrance bearing from it **NW.** by **N.  $\frac{1}{4}$  N.,** distant  $3\frac{1}{2}$  miles.

**Port Stewart** is much embarrassed by islands and reefs; at its head is an extensive mud flat. There is no anchorage here except for very small vessels.

Beyond this point the survey has not extended, and the only information regarding it is mostly from the maps and notes of Vancouver.

The eastern shore, from Traitors' Cove to Bell Island, is said to consist of many islands with deep navigable channels between.

On the western shore, about 7 miles above Port Stewart, lies Spacious Bay, about 2 miles wide at the entrance, and several miles in depth; near the middle of the entrance is a large wooded islet; there is no safe channel on its **S.** side. It is probable that this bay affords an anchorage.

**McDonald Bay**, locally known as Yes Bay, is a narrow, deep inlet, extending to the westward about 5 miles. A cannery has been established about 2 miles within the inlet; a somewhat contracted anchorage may be had in mid-channel, just below the cannery. Above the cannery are said to be rocks, some of which show at low water.

**Bell Island**, about 5 miles above McDonald Bay, divides the canal into two channels; the northern one is reported as shallow.

Of Baily Bay and Short Bay no descriptions are given.

Lieutenant Commander Newell reports that from Point Caamano to Burroughs Bay a mid-channel course passing to southward of Bell Island carries clear.

#### TIDES IN BEHM CANAL.

The tides follow the general directions of the channel with a strength of 1 to  $1\frac{1}{2}$  knots. The tides probably meet somewhere in the vicinity of Point Whaley.

At Naha Bay it is high water, full and change, at  $13^h 00^m$ , with a mean rise and fall of  $12\frac{1}{2}$  feet. This is 51 minutes later than at Ward Cove, and the mean rise and fall is  $2\frac{1}{2}$  feet less.

#### CLARENCE STRAIT FROM POINT CAAMANO.

Clarence Strait changes its direction somewhat at Point Caamano, being deflected to the westward by Cleveland Peninsula.

From Caamano Point to Ship Island, a distance of 10 miles, the **NE.** shore of Clarence Strait trends, with a slight curve, to the **W.** by **N.**, with bold, steep shores rising rapidly back to the mountains of the peninsula, and wooded to the water's edge.

**Ship Island** is a small, low island, showing a few trees; when seen at a distance it somewhat resembles a vessel under sail. It lies  $\frac{1}{4}$  mile off shore, and has a clear 7-fathom channel inside it; at high water it shows as two islets; at the **SE.** end is a ledge extending a short distance to the southward.

At Ship Island the coast line changes direction to **NW.** for 10 miles to Point Lemesurier. The same general characteristics of the coast prevail. Point Lemesurier is a long, low, flat point with heavy timber.

About  $1\frac{3}{4}$  miles to the **SE.** of Point Lemesurier the shore turns to the northeastward, forming a bight, which is almost entirely filled with islets and rocks. Between these islets and the point is an island about  $\frac{1}{2}$  mile long and lying about  $\frac{3}{8}$  mile off shore, with outlying rocks at either end. There is a clear passage, and a possible anchorage in 16 fathoms, inside this island, but it should not be attempted without local knowledge or at low water, when all the dangers are visible; the passage at the **N.** end of the island has 5 fathoms least water.

**Lemley Rocks**, lying  $\frac{1}{4}$  mile off shore on the prolongation of Point Lemesurier, are low and bare. They are three in number, with sunken rocks between them. The shores are bold and there is a good passage inside these rocks, but the currents are very strong.

**McHenry Ledge**, always covered, and showing kelp only at extreme low water, lies **W.** by **N.**  $\frac{1}{2}$  **N.**,  $\frac{1}{4}$  mile from the largest Lemley Rock. There is a good deep passage between Lemley Rocks and McHenry Ledge.

The long, low point of which Lemesurier is the extreme, forms the southwestern shore of a deep bay called Union Bay. At its entrance this bay is  $3\frac{1}{2}$  miles wide, narrowing to  $1\frac{1}{4}$  miles at its head, and is about 3 miles deep; at its head is a large shallow lagoon, into which empties a large mountain stream, which is a favorite resort for salmon. The waters of the bay are deep, but there is an anchorage, with good protection from the southward, on the **E.** side of the head of the bay, in about 18 fathoms. The **SW.** angle of the bay is foul for  $\frac{1}{4}$  mile off shore.

No particular directions seem necessary for anchoring in Union Bay. Proper precautions should be taken, if passing through the channels inside McHenry Ledge, to guard against the usual strong currents. At high water do not approach the head of the bay too rapidly. At half tide the shoal points of entrance to the lagoon will uncover, and at low water it is almost bare.

Anchor in 18 fathoms,  $\frac{3}{8}$  mile off shore, on the **E.** side of the head of the bay.

The **SW.** shore of Clarence Strait, from Grindall Island, has the same general direction as the **NE.** shore, with a corresponding convex curve.

**Streets Island**, a large bare rock lying  $\frac{3}{4}$  mile off shore, is  $2\frac{1}{2}$  miles above Grindall Island; there is a clear passage inside it.

From Streets Island to Tolstoi Point, about 14 miles, the shores are steep and somewhat irregular, with small rocks and islets lying close inshore. Six and a half miles above Streets Island is a narrow inlet about  $\frac{3}{4}$  mile deep; it has but 3 fathoms at the entrance, and only affords shelter to very small vessels. About 4 miles above this is another small inlet, irregular in shape and embarrassed at its entrance by reefs; it can only be used by small vessels. This latter inlet is marked by two big land slides in the face of the mountain immediately over it; they are visible from the southward and eastward for 25 miles.

**Tolstoi Point**,  $14\frac{1}{4}$  miles from Streets Island, is a high, wooded, bluff point, forming the **E.** entrance point to a large sound which develops into several deep arms. The face of Tolstoi Point is about 1 mile in width **NE.** and **SW.**; off its northeastern angle lies a small bare rock, close inshore, and off its southwestern angle is another rock quite close inshore, with a sunken rock inside of it.

**Tolstoi Bay** is the broad open arm inside Tolstoi Point, and having a general **S SE.** direction for about 4 miles; at the entrance it is about  $\frac{7}{8}$  mile wide, narrowing to a little less than  $\frac{1}{2}$  mile at the anchorage. Along the eastern shore at the head of the bay is a line of islets and rocks, some of which are covered at high water. There is a good anchorage in about 18 fathoms near the head of the bay; it is perfectly protected from all directions except **N NW.**, and from that direction it is probable that a gale would not blow home. The **E.** shore of the bay is high and steep; the head of the bay is an extensive mud flat, and the land is low and marshy; there is a portage of  $1\frac{1}{4}$  miles from it to the head of Kasaan Bay.

**Thorne Bay** is **W.** of the entrance to Tolstoi Bay, and immediately adjacent to it; it has a somewhat irregular westerly direction. The entrance is somewhat confused by a large island, with smaller ones at either end. In the bight opposite the **S.** end of this large island appears to be a small anchorage, with a 12-foot channel leading from it into Thorne Bay, the entrance to the bight from the northward having deep water. There is no safe passage inside the group of small islands lying close to the **W.** entrance point to Tolstoi Bay, although entering from the **SE.**, between sunken rocks, contracted anchorage will be found.

On the **W.** side of Tolstoi Bay,  $1\frac{1}{4}$  miles inside the **W.** entrance point, is a small harbor, the entrance to which is marked by a small wooded islet lying about 150 yards off shore; the entrance to

the harbor is obstructed by an islet in mid-channel and a rock that shows at low water on its **SW.** side, leaving a deep, clear channel less than 100 yards in width on its **NE.** side; the harbor is nearly  $\frac{1}{2}$  mile long and  $\frac{1}{8}$  mile wide; the anchorage is in about 9 fathoms near the middle of the harbor. In entering pass to the southward of the outlying island.

The best entrance to Thorne Bay is to the northward of the large island, and between it and a small island lying **N.** of it close to the main shore. This entrance is somewhat tortuous and rocky on its western side. To the southward, just inside this passage, is an indentation about  $\frac{1}{8}$  mile wide and  $\frac{1}{2}$  mile deep, where a salmon fishery has been established by the Indians.

Thorne Bay is about 4 miles long and about  $\frac{1}{2}$  mile wide, with a general depth of 8 fathoms. It offers no advantages and is not open to navigation by large vessels.

Tolstoi Bay can be entered at any time and in any weather.

Tolstoi Island, low and flat, with a few scraggy trees, lies 2 miles **W NW.** from Tolstoi Point and about  $\frac{3}{8}$  mile off the western shore. It has deep water close-to.

About  $\frac{1}{2}$  mile **SW.** of Tolstoi Island is a clump of rocky islets, lying close inshore and nearly closing the mouth of a small inlet. A second and larger inlet  $\frac{1}{4}$  mile further to the **SW.**, called **Snug Anchorage**, affords an excellent though contracted anchorage. Near the center of the anchorage is an island. Keep the **S.** shore of the inlet very close aboard in entering.

#### DIRECTIONS FOR TOLSTOI BAY.

Enter as convenient between Tolstoi Island and Tolstoi Point. When the bay is well open a **S SE.** course, passing nearly  $\frac{3}{8}$  mile off the **E.** entrance point, leads clear until up with the shallow inlet on the **E.** side, marked by a small islet close to its **S.** entrance point, whence a **S.  $\frac{1}{4}$  E.** course leads to the anchorage in 18 fathoms, midway between a small wooded islet, bearing **E.  $\frac{3}{4}$  N.**, and the mainland.

**Tides.**—In Tolstoi Bay it is high water, full and change, at 12<sup>h</sup> 48<sup>m</sup>, with a mean rise and fall of 12 $\frac{1}{2}$  feet.

From Tolstoi Island to Narrow Point, a distance of 5 $\frac{3}{4}$  miles, the shore line is irregular, with many islets and rocks lying close inshore. Two miles above Tolstoi Island is a small cove with a small islet off its entrance; it affords shelter only for boats.

**Narrow Point\*** cannot be distinguished when approaching from the southward, but when close upon it, just to the northward, it may be distinguished as a small, steep, bluff projecting point. Vessels have anchored in the little bight just above the point, but it affords little shelter from winds blowing up the strait and none from the opposite direction.

The shore of Prince of Wales Island from Narrow Point to Luck Point, a distance of 15 miles, is comparatively straight and but little indented, with no outlying rocks or shoals. The waters in this part of Clarence Strait are deep and present no difficulties in navigation.

The flood tide flows northwesterly about 2 knots, and the ebb from 2 to 4 knots in an opposite direction, following the general course of the channel. Prince of Wales Island rises gradually to a height of 1,500 to 3,000 feet from 2 to 3 miles from the shore, and is densely wooded.

**Ratz Harbor.**—**NW.** by **W.  $\frac{1}{2}$  W.**, 7 miles from Narrow Point, is a small anchorage but little more than  $\frac{1}{2}$  mile long and  $\frac{1}{4}$  mile wide, called Ratz Harbor; it is completely land locked, furnishing shelter from all winds; a creek empties into its northwestern angle. The entrance to the harbor cannot be distinguished until close upon it; it is between two projecting rocky points, the northwestern one being a small high-water islet; from each entrance point a reef, bare at low water, projects toward the entrance, decreasing its navigable width to about 230 yards; when these reefs are covered the entrance appears about twice that width. Off the **NW.** point of entrance a line of kelp lies about  $\frac{1}{2}$  cable off shore.

A mid-channel course carries in clear, but the lead should be kept going and care taken. The survey of this harbor was but little more than a reconnaissance, though no dangers were discovered. A depth of from 5 to 8 fathoms was found at the entrance and from 8 to 11 fathoms inside. No particular directions are given.

One and a half miles to the southward and eastward is an inlet  $\frac{1}{4}$  mile in length, which should not be mistaken for Ratz Harbor, these two being the only indentations between Narrow Point and the islands close to Prince of Wales Island, near the entrance to Kashevarof Strait.

**Ratz Point.**—A little more than a mile above Ratz Harbor, a slight northerly curve to the shore forms Ratz Point, which can only be distinguished when close in and approaching from the southward; between this point and Ratz Harbor are a number of ledges and sunken rocks lying close to the shore. 6 $\frac{1}{2}$  miles above Ratz Harbor, and  $\frac{1}{8}$  mile off shore is a rock, awash at low water and showing kelp.

**Luck Point** lies 7 $\frac{1}{2}$  miles above Ratz Harbor, formed by a slight change to the westward in the direction of the shore line; immediately above the point is a ledge extending out in a **NNW.** direction; a rock at its outer limit,  $\frac{1}{4}$  mile off shore, bares at low water and is marked by kelp.

The northeastern shore of Clarence Strait, in this vicinity, is formed by Etolin Island. This island is about 25 miles long **NW.** and **SE.**, and about 15 miles greatest width; it is of irregular shape,

\* Tonki Point of the Russians.

and is deeply indented by 5 inlets, 2 of which, approaching from opposite sides, nearly divide the island. The land is high, some of the peaks near the NW. end being over 4,000 feet, while those at the south-eastern are nearly as high.

Off the southeastern end of Etolin Island is a group of five low islands, the largest of which is Onslow Island,  $3\frac{1}{4}$  miles long NW. and SE. Besides this group of moderate-sized islands there are numerous small islets clustered about them. These islands are all comparatively low and well wooded, the greatest elevation being a knoll on Onslow Island about 350 feet high.

**Point Onslow.**—About  $4\frac{1}{4}$  miles NW.  $\frac{1}{4}$  N. from Point Lemesurier, and  $1\frac{1}{2}$  miles E.  $\frac{1}{2}$  S. from the SE. point of Onslow Island, is Point Onslow; it is a small cluster of islets and rocks lying SE. from Eagle Island, of the Onslow group. There are several rocks, showing only at low water, lying off these islets, and also off the southern and western shore of Onslow Island, and these shores should not be approached nearer than  $\frac{1}{2}$  mile.

The channels among the Onslow group of islands will probably admit the passage of a small vessel, but sunken rocks are known to exist, and as but few soundings were made, it would not be advisable to make the attempt.

Ernest Sound is the broad sheet of water between Point Lemesurier and Point Onslow. It trends off to the northward, connected by two narrow channels with Sumner Strait, in the vicinity of the mouth of the Stikine River.

**Dewey Anchorage.**—This harbor lies immediately NNW. of Onslow Island, and is well sheltered from southerly winds. The bottom is irregular and rocky, and close to Etolin Island a current, which attains a velocity of 2 knots, sets in the opposite direction to the current in Clarence Strait. In SE. gales the wind draws strong through the passages N. of Onslow Island.

The best anchorage is in 15 fathoms, a little less than  $\frac{1}{2}$  mile NW. from Carlton Island.

There are several dangerous reefs lying at the entrance to this anchorage, and it should not be attempted at night or in thick weather.

A reef, which uncovers at lowest tides, lies  $\frac{5}{8}$  mile S.  $\frac{3}{4}$  W. from Gull Point; this reef is covered with kelp.

Another reef,  $\frac{5}{8}$  mile S. of Mabel Island, uncovers 6 feet at mean low water; this reef shows no kelp.

A small sunken rock lies due W.  $\frac{1}{8}$  mile from Gull Point.

A large reef, which uncovers about 6 feet at mean low water, lies  $\frac{3}{4}$  mile W. by N.  $\frac{1}{2}$  N. from Mabel Island, and a small rock, which uncovers about 15 minutes later than the reef, lies  $\frac{1}{4}$  mile SW. from it.

There is a passage to the anchorage between Mabel and Center Islands, but as the bottom is very uneven and rocky, with a possibility of there being ledges on which a vessel might strike, the better known entrance E. of Mabel Island should be preferred.

The islands in this vicinity are low and thickly wooded. The coast of Etolin Island near this anchorage is also low, with several natural clearings a short distance back, after which the land rises gradually to the heights on the E. side of the island.

**Tides.**—At Dewey Anchorage it is high water, full and change, at 12<sup>h</sup> 22<sup>m</sup>, with a mean rise and fall of 14 feet.

#### DIRECTIONS FOR DEWEY ANCHORAGE.

**From the Southward,** the eastern limit of Mabel Island in range with the eastern limit of Center Island N. by W.  $\frac{1}{4}$  W. clears all danger; steer this course until Gull Point bears NE., when a N. by E. course carries clear to the anchorage in 15 fathoms, about  $\frac{3}{8}$  mile off Carlton Island, bearing SE., and the S. limit of Center Island in range with the S. limit of Kelp Point W. by N.,  $\frac{1}{8}$  N.

**From the Northward.**—Round Double Island at  $\frac{1}{2}$  mile distance, and steer ESE.  $\frac{1}{4}$  S., until the passage between Carlton Island and Onslow Island opens N. of Mabel Island, whence an E.  $\frac{1}{2}$  N. course carries clear to the anchorage. As this last course passes over a rocky shoal, having a least known depth of 4 fathoms, with a possibility of less, it should be undertaken with caution.

The passage from the southward is the only one recommended.

**Kelp Point** is a bluff rocky point with two islands, one of them double at high water, lying  $\frac{3}{4}$  mile S. of it. Split Island, approaching from the westward, appears as if a trail had been cut through the trees, the "lane" showing for many miles.

There appear to be no hidden dangers outside these islands, but as there are numerous rocks and reefs inside them, it would be safe, in passing, to give Double Island a berth of at least  $\frac{1}{2}$  mile.

**McHenry Anchorage.**—This is a very snug and secure anchorage, formed by Kelp Point on the S. and a group of islands lying close to the Etolin Island shore on the N. The harbor is about  $\frac{1}{2}$  mile long by a little more than  $\frac{1}{4}$  mile in width; the entrance lies due E.  $5\frac{1}{4}$  miles from the small islet off Point Stanhope, and in range with that point and the S. point of Blashke Island. The large islands forming the N. side of the harbor cannot, in approaching, be readily distinguished from the mainland.

Off the NW. angle of Kelp Point, which is low and grassy, is a small low islet, called Sand Island, having one green bush on it; a reef extends a short distance WNW. from this islet; the reef bares at low water and shows kelp.

The NW. point of entrance of the harbor shows a compact group of bare rocks, the outer one called Quartz Rock, and one small islet called Avon Island. The entrance to McHenry Anchorage lies between this islet on the NW. and the reef off Sand Island on the SE.; it is about  $\frac{3}{8}$  mile wide; 10 fathoms can be carried through the entrance. There is good holding ground, muddy bottom, in from 7 to 12 fathoms in any part of the harbor, and there are no known dangers. The best anchorage is in the SE. part of the harbor, which gives shelter from all winds.

The land in this vicinity is low and densely wooded, with hills several hundred feet high directly back from the coast. There is a small islet close to shore at the head of the harbor. A narrow boat passage at the NE. angle leads to the northward of the islands on the N. side.

#### DIRECTIONS FOR McHENRY ANCHORAGE.

**From the Southward.**—Keep to the westward of the line between Onslow Island and Double Island; when Double Island bears E.,  $\frac{1}{4}$  mile, steer NNW.  $\frac{1}{2}$  W. with Avon Island just open on the starboard bow; pass in close to Avon Island, being careful not to haul in until past the reef off Sand Island, and anchor at discretion.

**From the Northward.**—With the small islet off Point Stanhope bearing N., distant 1 mile, a course E. by N. leads directly in. In all cases keep the N. entrance islet aboard, to avoid the reef off Sand Island.

From McHenry Anchorage the shore of Etolin Island trends NW. for 6 miles, then turns sharply to the southward and westward for 8 miles to Point Stanhope, at the SE. end of Stanhope Island, forming a large open sound, from which three inlets and a large bay penetrate Etolin Island. Along the shores are numerous islets, rocks, and reefs, thus rendering the navigation somewhat intricate. Except for salmon, these inlets and the bay are of no practical importance.

**McHenry Inlet**, the first from McHenry Anchorage, and less than 2 miles above it, is about 4 miles long and 1 mile wide at the entrance, extending into the island in a general NE. direction. Numerous rocks and islets stretch across its entrance, and for about 1 mile inside. No soundings have been made in this inlet.

**Burnett Inlet**, about 3 miles NW. of McHenry Inlet, makes into the island NNW.  $\frac{1}{2}$  W. for about 7 miles, with an average width of less than  $\frac{1}{4}$  mile. A few low-water rocks lie close to the mouth of this inlet, close to the shores, but for the greater part of its length it is apparently free from dangers. About 4 miles from the entrance a few soundings were taken in from 3 to 9 fathoms; outside of this the water seems to be much deeper. The head of this inlet connects by a low portage,  $\frac{1}{4}$  mile wide, with the head of Anita Bay entering the island from the northward.

**Mosman Inlet**, nearly 2 miles SW. from Burnett Inlet, makes into the island NW.  $\frac{1}{2}$  W. for about 6 miles, with an average width of a little more than  $\frac{1}{4}$  mile. This inlet has not been sounded out, but it appears to be free from dangers, only one low-water rock having been seen near its mouth on the NE. side.

In these inlets the land on both sides is high, except at the N. end of Burnett Inlet, which is low and flat.

At the mouth of Mosman Inlet is a large island and several small ones; between this island and Point Stanhope is Rocky Bay, thickly studded with rocky islets and sunken rocks; none were discovered outside the line between the island and the point, but as few soundings were taken in that locality, it would be well to approach this bay with caution. It presents no advantages as an anchorage. A large lake, called Streets Lake, has its outlet in the middle bight, at the head of Rocky Bay.

**Point Stanhope** is the southeastern extremity of Stanhope Island, and is  $18\frac{1}{2}$  miles WNW.  $\frac{1}{4}$  N. from Point Lemesurier. The island is about  $1\frac{1}{2}$  miles long by  $\frac{1}{2}$  mile wide; it is from 50 to 100 feet high, and is covered with trees. Off its southeastern point is a reef extending out nearly  $\frac{1}{2}$  mile, and covered with kelp. SW. from the southern point of the island is a small islet, close inshore, with rocks and kelp reefs extending S. from it nearly  $\frac{1}{4}$  mile. A sounding  $\frac{1}{2}$  mile S. of the islet gave  $7\frac{1}{2}$  fathoms, rocky bottom.

Between Stanhope Island and the point of Etolin Island to the NW., are many islands and rocks lying close together, and, except from a point in Clarence Strait nearly S. of them, Stanhope Island and the group of smaller ones appear to be a part of Etolin Island. Kelp shows in large patches  $\frac{1}{4}$  mile to southward of these islands.

**Abraham Islet** is  $3\frac{1}{2}$  miles W. by N.  $\frac{1}{2}$  N. from Point Stanhope, and  $\frac{5}{8}$  mile off shore; it is a small, low islet, but little more than  $\frac{1}{4}$  mile long, and about 50 yards wide, and covered with trees. SSE.  $\frac{1}{2}$  E. from this islet, distant a little more than  $\frac{1}{4}$  mile, is a bare, rocky islet, with low-water rocks about it and close-to.

**Lincoln Rock**, WSW. from the center of Abraham islet, and a little more than  $\frac{1}{4}$  mile from it, is a dangerous rock; it is awash only at extreme low tides, and is not always marked by kelp. An eighth of a mile NE. from Lincoln Rock is another rock which bares at half tide, and NE. of this, nearly  $\frac{1}{4}$  mile, is a bare, rocky islet.

Vessels should keep well into the middle of Clarence Strait to avoid these dangers.

# 110 CLARENCE STRAIT, PT. VALLENAR TO PT. HARRINGTON—DIRECTIONS.

**Screen Islands**, lying  $\frac{1}{2}$  mile off shore, and extending  $1\frac{1}{2}$  miles parallel to the coast, are 5 miles NW. by W.  $\frac{3}{4}$  W. from Point Stanhope. The islands of this group are low and covered with trees; inside them, along the Etolin Island shore, are numerous rocks showing at various stages of the tides; there is a navigable channel inside, but it is not desirable without local knowledge.

**Marsh Island**, low and wooded, lies  $1\frac{1}{4}$  miles NW. of Screen Islands; it is about  $\frac{1}{2}$  mile long and  $\frac{1}{4}$  mile wide, and lies off a bight in the Etolin Island shore, formed by a point projecting from that Island. It is reported that vessels have anchored in this bight, but it would not appear to be a desirable anchorage for any length of time; a rock shows at low water in the bight, about 100 yards off the Etolin Island shore. Three-quarters of a mile NW. from Marsh Island and  $\frac{1}{4}$  mile off shore is a rock that bares at low water, and  $\frac{1}{4}$  mile farther NW. is a small islet also about  $\frac{1}{4}$  mile off shore.

**Point Harrington**,  $10\frac{1}{4}$  miles to the NW. of Point Stanhope, is on the extreme NW. end of Observation Island, a high-water island about  $\frac{3}{8}$  mile long and from 50 to 100 feet high, lying close to a point of Etolin Island which projects to the NW., and to the eastward of which is Steamer Bay, open to the NW. Observation Island is covered with low trees and green bushes. A rocky ledge projects about 150 yards beyond Point Harrington. The point is not conspicuous from a distance; it is low, rough, and rocky, and in summer can be recognized by its bright green appearance, due to a dense growth of bushes upon it.

The peninsula from which the point extends is about 2,000 feet high, and, with the Keating Range 2 miles to the northeastward and 1,000 feet higher, is conspicuous in the middle of the strait from far to the southeastward.

**Steamer Bay** extends from Point Harrington at its SW. entrance about, 2 miles SE. by E.  $\frac{1}{2}$  E. into Etolin Island; at its entrance the bay is about 1 mile wide, gradually contracting near its head to  $\frac{1}{4}$  mile, then again widening into a basin  $\frac{1}{4}$  mile in diameter, into which a large creek empties; this creek has its source in a small lake lying very near Streets Lake.

The NE. shore of Steamer Bay is formed by the steep, bluff banks of Etolin Island; it is somewhat irregular, and at  $1\frac{1}{2}$  miles N. of Point Harrington rounds into a broad bight 1 mile deep, with two islands close to shore at its head.

East of Point Harrington, about  $\frac{1}{8}$  mile off a point of Etolin Island, are some small islets and rocks. The SW. shores of the bay are very irregular, but have no outlying dangers. About half way into the bay, on the NE. shore where it begins to contract in width, is a point off which, about  $\frac{1}{8}$  mile, are several rocks that cover at high water; they form no obstruction to the entrance.

On the NE. side of the entrance to the inner basin is a small, wooded, high-water island. The bay is easy of access, a course SE. by E.  $\frac{1}{2}$  E. in mid-channel leading fair into the inner basin. On the northern side of this basin is a small, rocky islet called Independence Islet, which covers at extreme high water. The best anchorage is probably a little E SE. of the middle of the basin in about 16 fathoms, though a small vessel may find better bottom by anchoring in 10 fathoms closer to the eastern shore. The SE. winds draw with considerable force out of the creek, and the holding ground is not very good. No particular directions seem to be necessary for this anchorage.

**Tides.**—It is high water, full and change, at Steamer Bay at 0<sup>h</sup> 26<sup>m</sup>, the mean rise and fall of tide  $13\frac{1}{2}$  feet. Spring tides rise 21 feet.

## SAILING DIRECTIONS

### FOR CLARENCE STRAIT.—VALLENAR POINT TO POINT HARRINGTON.

From a point  $3\frac{1}{2}$  miles SW. by W. from Vallenar Point a course W. by N.  $\frac{3}{4}$  N. leads clear up Clarence Strait for 13 miles, when Ship Island should bear NE., distant 1 mile, and a NW.  $\frac{3}{4}$  W. course for  $9\frac{1}{2}$  miles farther in mid-channel will bring Point Lemesurier to bear NE. by E.  $\frac{1}{2}$  E., 3 miles distant.

If bound into Tolstoi Bay, steer from Ship Island W.  $\frac{3}{4}$  N. round Tolstoi Point and enter the bay as previously directed.

From Lemesurier Point a course NW. by W.  $\frac{1}{2}$  W. for  $23\frac{1}{2}$  miles passes 1 mile to the westward of the dangerous Lincoln Rock. In the strength of the tide there is generally a current setting in or out of Ernest Sound.

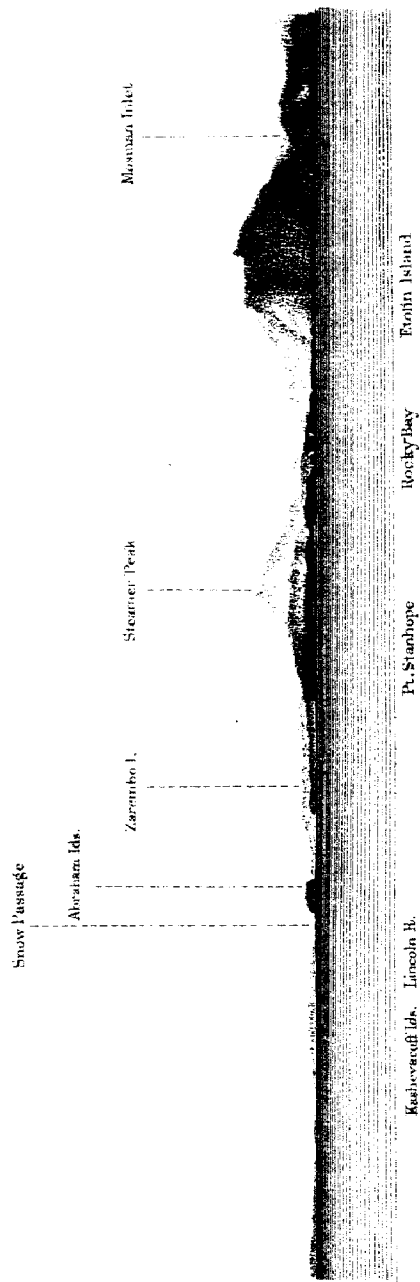
When Abraham Islet eastward of Lincoln Rock bears E. that rock will have been passed, and a NW.  $\frac{1}{2}$  W. course leads clear up the strait.

## ERNEST SOUND.

This large body of water opens from Clarence Strait between Point Lemesurier and Point Onslow, with a width of about 4 miles between the points. Its general direction is N. by W. for 25 miles to Point Warde. From this point, under the name of Bradfield Canal, it extends 17 miles in a general E NE. direction, with a width of about 1 mile, and terminating in an extensive mud flat.

From Ernest Sound two arms extend to the northward and westward, and joining near the mouth of the Stikine River, inclose Wrangell Island. The lower part of the northernmost arm is called Blake Channel and the upper part Eastern Passage. A passage to Wrangell through Ernest Sound,





View from Clarence Strait. Pt. Stanhope N.W. by  $W\frac{1}{2}W$ . 6 Miles

Blake Channel, and Eastern Passage is practicable, and was formerly followed by the Hudson Bay Company's trading steamers.

The western shore of Ernest Sound is formed by Etolin Island and the eastern shore by the mainland of the continent; both shores are high and densely wooded. There are numerous small islands in the sound, and two large ones, one on each side, about midway of its length.

About 4 miles **NE.** by **E.  $\frac{1}{2}$  E.** from Point Lemesurier is a projecting point dividing Union Bay from Vixen Inlet; this inlet makes into the mainland in an easterly direction about 3 miles, with a small island in the middle of the entrance; a large stream flows into this inlet. No soundings were taken, but the shore line is accurately charted, and also such rocks as could be seen at the various stages of the tide. This refers to the whole of Ernest Sound as well, soundings having been taken only in the main channels. Vessels navigating the sound should proceed with caution, especially if obliged to approach the shores.

Union Bay has already been described.

On the **W.** side of Ernest Sound, **NW.** from Vixen Inlet, is Brownson Island, about 7 miles long **NW.** and **SE.**, and from 1 to 2 miles wide. The island is about 1,000 feet high, and is separated from Etolin Island by a narrow passage called Canoe Passage, which is navigable only by boats. A number of small islands are clustered around the southern end of Brownson Island, and one low-water rock was noted to the eastward of its southern end, about  $\frac{3}{4}$  mile off shore and nearly  $\frac{1}{4}$  mile **NE.** of one of the smaller islands. Several rocks were seen at low water **S.** of the southern end of Brownson Island, the most distant being  $2\frac{1}{2}$  miles from it, but they are all to the westward of the main channel.

Northeast of Brownson Island, on the opposite side of the sound, is Deer Island, also about 7 miles long and 2 miles wide, and about 1,500 feet high. There is a passage between this island and the mainland, called Seward Passage; it is apparently unobstructed, but it has not been sounded out.

Midway between the northwestern ends of Brownson and Deer islands is a cluster of small islands called Niblack Islands; there is a clear passage on either side, but the **NE.** side is most direct.

West from Niblack Islands Menefee Inlet enters Etolin Island  $5\frac{1}{2}$  miles in a general **W. NW.** direction, with a width at its entrance of nearly 1 mile. This inlet is apparently deep and unobstructed; at its mouth are three islets.

Southwest Cove is an inlet about  $1\frac{1}{4}$  miles deep and  $\frac{1}{2}$  mile wide, lying **N NW.  $\frac{1}{2}$  W.** from the largest islet at the mouth of Menefee Inlet. No description of this cove is available.

Northwest of Deer Island and on the opposite shore are several islands and Blanche Rock, a white rock showing about 10 feet above high water.

Found Island, a mile **N.** of Blanche Rock, is a little more than  $\frac{1}{4}$  mile in diameter, with outlying rocks  $\frac{1}{4}$  mile off its northwestern side, which show at low water. This island lies at the entrance of Zimovia Strait.

The southeastern end of Wrangell Island completes the western shore of Ernest Sound. Two indentations known as Southeast Cove and Fools Inlet project into the island; the former is an open bight lying  $2\frac{1}{2}$  miles **NW.** from the **N.** point of Deer Island, and the latter, lying opposite Point Warde, being about 3 miles long, with good water and seemingly free from danger; at its upper end are two small islets, beyond which the water shoals, and the shores are low and grassy. On both sides the hills are high and rise abruptly.

**Tides.**—The tides in Ernest Sound follow the general direction of the channel. The ebb runs from 2 to 4 knots, the flood a little less.

Particular directions do not seem necessary for the navigation of Ernest Sound. Entering in mid-channel **N.** of Point Lemesurier, a course should be shaped to pass midway between the two islets about 9 miles up the sound, and when between them change course to **N.** or **N.  $\frac{1}{2}$  W.** for the middle of Deer Island, whence keep a mid-channel course between Niblack Islands and the small islands lying close to the **SW.** side of Deer Island. When above Niblack Islands keep Blanche Rock to the westward, and the course may be again changed for Point Warde, at the entrance to Bradfield Canal.

Zimovia Strait, connecting Ernest Sound with the waters **W.** of Wrangell Island, is briefly described:

It forms the northern shore of Etolin Island and at the same time the southern shore of Wrangell Island, and passing to the eastward and northward of Woronkofski Island enters the broad sheet of water at the mouth of the Stikine River.

Its length from Found Island to the **NW.** end of Wrangell Island is about 25 miles, and in width it varies from less than  $\frac{1}{2}$  mile to  $2\frac{1}{2}$  miles. For nearly 6 miles from Found Island it has a **W.  $\frac{1}{2}$  N.** direction, and is apparently free from dangers; for the next 6 miles it is obstructed by islets, shoals, and sunken rocks, stretching entirely across it, and, according to the report of the surveying officers, rendering its passage by a vessel utterly impracticable. There is a deserted Indian village 8 miles above Found Island on the Wrangell Island shore, and the group of islets and rocks in the channel were called Village Islets.

In this vicinity the tides meet, the flood coming from the northward meeting the flood from Ernest Sound.

## BRADFIELD CANAL.

About  $2\frac{1}{2}$  miles westward from Village Islets, Anita Bay makes into Etolin Island about  $5\frac{1}{2}$  miles in a southerly and westerly direction, with an average width of about 1 mile. The head of Anita Bay approaches within  $\frac{1}{2}$  mile of the head of Burnett Inlet, entering from the opposite side of the island. Anita Bay is apparently free from obstruction, and an anchorage may be had near its head.

From Anita Bay, Zimovia Strait turns to the NW. by N. to its termination, and is free from dangers except Young Rock, described with Chichagoff Pass, and a few outlying rocky islets close to the Wrangell Island shore.\*

## BRADFIELD CANAL.

From Point Warde, Ernest Sound is continued under the name of Bradfield Canal, making into the continent about 17 miles in an E. NE. direction. About 5 miles to the northeastward of Point Warde, on the southern shore, is an open bight called Anan Bay, with a large stream entering at its head. About 7 miles beyond this bay the canal is nearly closed by Duck Island. There is no passage on the southern side of this island, but a large stream draining an extensive valley empties here. The tide "backs" for  $1\frac{1}{2}$  miles into this stream.

A navigable channel exists on the N. side of Duck Island, a small islet on the northern shore, reducing this channel to  $\frac{1}{4}$  mile in width; beyond Duck Island the canal continues 2 miles, where it ends in a broad flat off the mouths of two large streams.

The shores of Bradfield Canal are bold, and the heights on either side lofty and snow-covered. On the northern side near Duck Island is a high, rugged, double peak, with a deep saddle or gulch between the peaks; this can be seen from the entrance to the canal and is called Mount Kapho (Brothers). On the southern side near the head of the canal is another high peak called Mount Tyee (Chief), also seen from the entrance. The estimated heights of these peaks was 5,000 to 6,000 feet.

On the southern side near the head of the canal the mountains are broken and form cliffs 1,000 feet high. On both sides are numerous streams and waterfalls from the melting snow.

There are no dangers apparent in the canal.

## BLAKE CHANNEL.

This channel branching from Bradfield Canal has its entrance 3 miles N NE. from Point Warde. It lies between Wrangell Island and the mainland, having a general NW. course for 10 miles, its average width being about  $\frac{3}{4}$  mile.

Blake Island lies at the entrance, with a narrow channel on either side.

The western channel at its narrowest part is somewhat less than  $\frac{1}{4}$  mile wide.

The eastern channel is narrowest at the NW. end of the island, where several rocks showing at half tide extend out from the end of the island, the reef terminating in a bluff wooded islet  $\frac{3}{8}$  mile NW. of the island.

Both channels are apparently free from dangers, except the rocks mentioned; but as the tides run very strong in this vicinity a mid-channel course should be kept. The eastern channel is to the eastward of the rocks and small bluff islet noted above.

From Blake Island to a small island in mid-channel  $7\frac{1}{2}$  miles to the NW., the shores of the canal are bold and high; no dangers were observed.

At this latter island the channel turns to the westward; NE. of the island a bay makes to the northward into the mainland, with extensive flats at its head; anchorage may be had here, but it has not been carefully examined. There is a passage on each side of the island, though that to the northward is preferable.

In Blake Channel the tides run from 2 to 3 knots an hour; the flood runs to the northward.

Three miles within the reach trending to the westward are two islets, close to the northern shore, and about  $1\frac{1}{2}$  miles apart. One mile beyond the western one the channel turns to the SSW. for about  $1\frac{1}{4}$  miles, and then opens into Eastern Passage. The width in this last reach is much diminished when it opens into the passage, being but  $\frac{1}{4}$  mile wide, but the shores are bold, with deep water close-to, and no apparent dangers.

## EASTERN PASSAGE.

From the narrow reach at the end of Blake Channel, the passage broadens suddenly into the SE. end of this passage; at the junction of the two is a good-sized island, lying close to the Wrangell Island shore; close to its northern end is a rock showing at low water. The channel is on the N. side of this island, favoring the N. shore.

Another island, slightly larger than the one just mentioned, lies  $1\frac{1}{2}$  miles WSW.  $\frac{1}{2}$  W. from it, with good water on both sides.

\* From the southern part of Wrangell Island there is shown on the old charts a narrow passage connecting Zimovia Strait with Eastern Passage at a point opposite Point Madan. This passage does not exist; what was known as Seward Island, being in fact the southern part of Wrangell Island.

Point Madan, a projecting peninsular point of the mainland, lies  $\frac{1}{2}$  mile **N NW.**  $\frac{1}{2}$  **W.** from this latter island; the peninsula is  $1\frac{1}{2}$  miles long, and forms the western side of a large open bay, which has not been examined.

The tides meet in the broad expanse **SE.** of Point Madan; the flood tide, flowing to the south-eastward from 2 to 3 knots in Eastern Passage, meeting the flood tide from Blake Channel.

From Point Madan the Eastern Passage is about  $1\frac{1}{2}$  miles in width and free from hidden dangers, and extends in a general **W NW.** direction for 10 miles, where it joins Sumner Strait and the waters from the Stikine River.

Blake Channel and Eastern Passage separate Wrangell Island from the mainland to the northward. Eastern Passage terminates at Point Highfield, the **NW.** point of Wrangell Island. This point is steep, bluff, and rocky; it is several hundred feet high and wooded.

Simonof Island, low, grassy, and showing a few trees and several Indian graves, lies **NE.** by **N.**  $\frac{5}{8}$  mile from Point Highfield. Between Simonof Island and Wrangell Island is an anchorage in from 6 to 12 fathoms, called Highfield Anchorage. About  $\frac{3}{4}$  mile **E.**  $\frac{1}{2}$  **S.** from Simonof Island, and nearly  $\frac{1}{4}$  mile off the Wrangell Island shore, is a reef which partly uncovers at low water.

No particular directions seem necessary for the navigation of Blake Channel and Eastern Passage, other than such as are already given; pass either side of Simonof Island not nearer than  $\frac{1}{8}$  mile; the termination of the extensive flats of the Stikine River is about 1 mile **NW.** from the island.

#### CLARENCE STRAIT FROM POINT STANHOPE.

The northern end of Clarence Strait above Point Stanhope and Luck Point, on Prince of Wales Island, broadens out to the westward about 11 miles, the western part being almost entirely filled with islands, reefs, and sunken rocks, but with a clear navigable passage about 3 miles in width along the Etolin Island shore.

Zarembo Island forms the northern side of this broad expanse, the **N.** end of Prince of Wales Island forming its western side. The latter is here comparatively low, with high land in the distance.

The extensive group of islands inclosed in these waters has been called the Kashevarof Islands.

From Luck Point the shore of Prince of Wales Island trends about **W.**  $\frac{1}{2}$  **N.** for 3 miles to a point, to the eastward of which is a group of rocks about  $\frac{1}{4}$  mile off shore, some of which show at half tide; these rocks are marked by kelp. Immediately to the westward of this point is a semicircular bight, extending  $\frac{1}{2}$  mile to the southward, at the bottom of which are two low-water rocks; on the western side of this bight is a low peninsular point, about 50 feet high, forming the eastern side of Coffman Cove. This cove is about  $\frac{3}{4}$  mile deep and  $\frac{1}{4}$  mile wide; the western side is formed by two islands, lying close together, and close to Prince of Wales Island; the northernmost of these has been called Coffman Island; their shores are fringed with rocks lying off from 100 to 200 yards, some only of which are bare at low water. Good anchorage in from 10 to 15 fathoms, muddy bottom, may be had in the central part of this cove, and a mid-channel course will carry in safely.

From Coffman Island to Point Nesbitt, of Zarembo Island, the Kashevarof Islands mark the western limit of the navigable portion of Clarence Strait. They are separately described.

North by west  $\frac{1}{2}$  west from Coffman Island, distant  $1\frac{1}{2}$  miles, are three small islets covered with straggling trees, and lying in the middle of the entrance to Kashevarof Passage. **E NE.** from these islets,  $\frac{3}{4}$  mile, is a reef which uncovers at half tide, and **NW.** by **N.** from them,  $\frac{3}{4}$  mile from the northwestern one, is a single rock which uncovers at half tide; these rocks are not marked by kelp.

**Key Reef.**—This reef lies **NE.** by **E.** 2 miles from the eastern end of East Island, one of the Kashevarof group, and  $3\frac{1}{2}$  miles **W.**  $\frac{1}{4}$  **N.** from Point Harrington. This large reef usually shows at high water as two rocks from 5 to 10 feet high, but they may be awash at extreme tides. A number of low-water rocks lie near this reef; one lying **SE.** by **E.**  $\frac{3}{4}$  mile distant, uncovers at about  $\frac{3}{4}$  ebb. If before high water, Key Reef shows plainly when approaching from the southward. There is a channel to the westward of it, but from the nature of the ground there may be sunken rocks not yet discovered, and it should always be passed to the eastward.

Point Nesbitt is the most southerly point of Zarembo Island. At this point Clarence Strait divides, one channel, called Stikine Strait, trending to the northeastward; the other, called Snow Passage, trending to the westward between the Kashevarof group and Zarembo Island.

**Nesbitt Reef** is  $\frac{3}{4}$  mile **SE.** by **S.** from Point Nesbitt; it is a dangerous reef, the highest part of which shows at half tide. The tides run very strong in this vicinity, and great care should be taken, especially in foggy weather, to avoid this reef.

**Zarembo Island.**—From Point Nesbitt the shores of Zarembo Island to the eastward trend **NE.**  $\frac{1}{2}$  **N.** for  $7\frac{1}{2}$  miles to Round Point, and are free from outlying dangers.

There are two mountain ridges extending across the island from **E.** to **W.**, one on the northern, the other on the southern side, with a wide valley between them. The highest peaks of these ridges, near the eastern end of the Island, are about 2,500 feet high. On the southern side, near Point Nesbitt, the land is comparatively low, rising gradually from the shore; midway to Round Point the shore becomes bluff, and the high land is nearer the coast; the island is thickly wooded.

## STIKINE STRAIT.

This strait, between Etolin and Zarembo Islands, is the northeastern branch of Clarence Strait, and connects it with the waters off the mouth of the Stikine River. From Steamer Bay to the strait the shore is bold with no outlying rocks. The coast of Etolin Island, at the southern entrance to Stikine Strait, trends **N. by E.** for 2 miles; lying a short distance off this shore are two islets, about 1 mile apart; both have bold water close to. On the opposite shore of Zarembo Island are several ledges, the longest of which projects  $\frac{1}{2}$  mile at low water; but at and near Round Point the shore is bluff and may be closely approached.

Passing the two islands on the Etolin Island shore, the shore trends more to the eastward, forming a large open bight. In the southwestern part of this bight is a small cove called Quiet Harbor. This cove, which may afford room for one or two small vessels, can hardly be termed a harbor, but it might afford temporary shelter should an emergency require it. About  $1\frac{1}{2}$  miles **NE.** of Quiet Harbor, and  $\frac{1}{2}$  mile off shore, is a small rocky islet, with deep water around it; to the **E NE.** of this are two low-water rocks close to the Etolin Island shore. Close to the **NW.** of this islet a sounding is given in 132 fathoms, but an anchorage might be found between the islet and the shore. A prominent wedge-shaped peak, called Red Mountain, 3,800 feet high, with bare precipitous sides, shows just above this part of Etolin Island.

At  $2\frac{1}{2}$  miles from Quiet Harbor the shore takes a sharp turn to the **N. by W.** for about 6 miles, when it again turns to the northward and eastward, forming the **S.** shore of Chichagof Pass, which connects Stikine Strait with Zimovia Strait.

From Round Point the coast of Zarembo Island trends **N. by W.  $\frac{3}{4}$  W.** to South Craig Point, a distance of 7 miles, with a deep bight between the two points and backed by a wide valley. Both shores of Stikine Strait are free from danger and may be approached closely, except at Reef Point, the southern extremity of Woronkofski Island, where a rock shows at low water, about  $\frac{1}{2}$  mile off shore.

Vessels bound to the northward to Wrangell may pass up Stikine Strait, turning at the **NW.** point of Woronkofski Island, or may go through Chichagof Pass, there being little or no difference in the distance of either course.

Chichagof Pass between Etolin and Woronkofski Islands is about 5 miles long and varies from  $\frac{3}{4}$  mile to 2 miles in width. To the westward of East Point of Woronkofski Island, off a moderately deep bight, is a small, wooded island  $\frac{1}{2}$  mile off shore, with low-water rocks close to its **N.** end.

**Young Rock.**—**SE.**  $\frac{1}{2}$  **E.**  $1\frac{1}{2}$  miles from East Point is a sunken rock with 12 feet of water on it at mean low tide; it is known as Young Rock. It shows no kelp and looks white when over it. The rock bears **E.** by **S.** from the island **SW.** of East Point, and a line between Chichagof Peak and the **N.** end of Etolin Island, **NE.**  $\frac{1}{2}$  **N.**, passes a little to the northward of it.

Navigating Zimovia Strait this rock is in mid-channel, and the Etolin Island shore should be kept close aboard until the above range is passed.

For about 2 miles **SE.** of Wrangell the Wrangell Island shore is rocky, with several projecting points from  $\frac{1}{8}$  to  $\frac{1}{4}$  mile off shore, and near the middle of the **N.** side of Woronkofski Island a reef projects about  $\frac{1}{2}$  mile. No other dangers are known to exist about the shores so far described.

## PORT WRANGELL,

or **Etolin Harbor**, lies on the **W.** side of the **NW.** point of Wrangell Island, 1 mile below Point Highfield. This harbor is formed by a narrow bluff point projecting  $\frac{1}{2}$  mile to the **NW.** by **W.** The anchorage ground, except for small craft, is outside the line between this point, called Shekesti Point, and the landing wharf off the village. About 100 yards **N.** of Point Shekesti is a reef covered with kelp which uncovers at low water.

The town of Wrangell was formerly a Russian trading station; it was occupied by the U. S. military at the time of the purchase of the territory and during the mining excitement on the Stikine River; it was at that time a place of considerable importance. It contains something over 100 houses, most of them being occupied by Indians. A Presbyterian and a Catholic church are located here. There is also a Presbyterian mission station here, and at one time there was a small Government training school for Indian children. In connection with the mission is a large farm on one of the islands at the mouth of the Stikine River. Officers of the civil government are stationed here, and considerable fur traffic is carried on with the Indians. In the winter the Stikine River miners usually rendezvous here. A post office is established and a mail steamer touches here both going and returning.

The shores in this locality are densely wooded, except in the immediate vicinity of the town where the trees have been cut for fuel; the ridge back of the village to the eastward is now covered with undergrowth. Two hills rise steeply to a height of 400 feet to the **NW.** of the town, while to the eastward the land rises to 2,500 feet; a low ridge back of the town connects these heights. A trail leads along the shore and across Point Highfield to Highfield Anchorage. On the **N.** end of the island there is considerable swampy land.

Station Point, low and sandy, with a ledge projecting **W.** by **N.** nearly  $\frac{1}{4}$  mile, lies  $\frac{3}{4}$  mile to the **SE.** of Point Shekesti; the outer extreme of the projecting ledge is always above water. This point was occupied as an astronomical station during the survey of 1886, and was found to be in

Latitude.....	56° 28' 15'' N.
Longitude.....	132° 22' 53'' W.

Variation 29° 20' **E.** in 1886.

Between Shekesti Point and Station Point is a moderately deep bight, affording an anchorage quite equal to that of Etolin Harbor; the anchorage is in about 15 fathoms,  $\frac{3}{4}$  mile **NW.**  $\frac{1}{4}$  **N.** from the bare extreme of the ledge off Station Point. In winter the **NE.** gales sweep over Wrangell with great force; in such a case the lower anchorage is less exposed and is preferable.

Shekesti Point is bluff, about 40 feet high, and grass covered; on it are a number of Indian houses and graves. The shores of the point are rocky, with an outlying fringe of ledges marked by kelp.

No particular directions are necessary for Etolin Harbor. Steer in about **NE.** by **E.**  $\frac{1}{2}$  **E.** for the middle of the entrance and anchor in about 12 fathoms, with Shekesti Point bearing **SE.** by **E.** Large vessels must anchor farther out.

**Tides.**—It is high water, full and change, at Etolin Harbor at 0<sup>h</sup> 26<sup>m</sup>, with a mean rise and fall of 13 $\frac{1}{2}$  feet. Extreme rise and fall 21 $\frac{1}{2}$  feet.

The glacial waters of the Stikine River usually discolor all the waters in this vicinity, and in the strength of the ebb tide eddies are noticed in Etolin Harbor. West of Etolin Harbor the flood tide runs to the **SW.** about  $\frac{1}{2}$  knot an hour and the ebb nearly due **S.** from 2 to 4 knots. In Zimovia Strait the ebb flows to the southward nearly 3 knots an hour and the flood to the northwestward about  $\frac{1}{2}$  knot, and in Stikine Strait about the same.

Strong **SE.** gales cause a considerable sea in Etolin Harbor; in that case vessels generally seek shelter in Highfield Anchorage at the **N.** end of Wrangell Island and about 1 $\frac{1}{2}$  miles above Etolin Harbor.

The shores above Etolin Harbor are steep and rocky, but without outlying dangers except a rock covered at about half tide, lying 100 yards off shore at a small sand beach  $\frac{3}{4}$  mile above the anchorage, and about  $\frac{1}{2}$  mile farther **N.** a ledge extending out about the same distance. Keeping outside these dangers follow the shore line around Point Highfield, where an anchorage may be had in 5 to 6 fathoms, with Simonof Island bearing **N.** by **W.** and midway between it and the point on the **E.** side of the bight to the eastward of Point Highfield.

In the spring of the year this anchorage is rendered unpleasant by the quantity of floating ice from the Stikine River, and the sub-surface and counter currents render a vessel uneasy at times.

Point Rothsay, on the mainland 6 $\frac{1}{2}$  miles **N NW.** from Point Highfield, is the **SE.** entrance point of the lower mouth of the Stikine River. It is high, bluff, and wooded.

Green Point lies 4 miles **SE.** by **S.** from Point Rothsay; here there is a small farm clearing and one or two houses, the clearing showing bright green in contrast with the surrounding wooded country. A mile and a quarter **NE.** of Green Point is Wrangell Peak, 3,080 feet high. The point is 2 miles **N.** by **W.** from Point Highfield.

Following comparatively close along the shores from Green Point to Point Rothsay is the narrow channel through the mud flat leading to the mouth of Stikine River. In 1887 this channel had a least water at low tide of about 2 feet, with a rise of about 18 feet at spring tides. This channel is from  $\frac{1}{4}$  to  $\frac{1}{2}$  mile wide, and usually changes with every freshet. A small stern-wheel steamer navigates the river in summer, starting from Wrangell.

From about 1 mile **SE.** from Green Point the southern limit of the mud flats of the Stikine River extends **WSW.** to the opposite shore of Mitkof Island, a distance of about 9 miles, and including nearly the whole of Kadin and Rynda Islands; **N.** of this line, except the narrow channel leading to the lower mouth of the river, is a mud flat dry at low water. There is, however, a high water boat passage on the **W.** side of Rynda Island. This great flat extends to the northward for 10 miles, and includes several large islands. It is called Dry Strait, and completely chokes the passage between Sumner Strait and Frederick Sound.

The Stikine River has its source in a small lake in the vicinity of latitude 57° 10' **N.** and longitude 128° 00' **W.**, and is about 200 miles in length. It flows through glaciers and gorges; one of the latter, very narrow and about 30 miles long, is known as the Great Cañon. The river freezes in the winter, and with the spring freshets the current runs with great force. On the **W.** side of the river mouth is Wilkes Range, consisting of a series of sharp mountain peaks from 2,845 to 3,586 feet in height.

The boundary line between Alaska and British Columbia is said to cross the Stikine River about 65 miles from Wrangell. Until more exact data are obtained this must remain in doubt.

The river has two mouths; one, the **N.** channel, following the mainland to the westward, and debouching with a broad flat into the head of Frederick Sound; the other follows the mainland to the southward, and forms the only navigable entrance to the river. The **N.** channel is navigable only by boats at high water.

On the bank of a creek emptying into the **N.** channel, about 2 miles **NE.** of Point Rothsay, is an extensive garnet ledge. A salmon cannery has been established about a mile **SSE.** of Point Rothsay.

Between the mouths of the Stikine River are two large islands, Farm Island and Dry Island, the latter being to the westward.

**Farm Island** is about 6 miles long **N.** and **S.**, and  $2\frac{1}{2}$  miles wide; this island is low except a peak 2,500 feet high on its northern end.

**Dry Island** is about 3 miles square; on it are three mountain peaks close together, all over 2,000 feet high. Between these islands is a narrow canoe passage, bare at low water.

In the lower mouth of the river, **E.** of Farm Island, is a group of low wooded islets, called the Cottonwood Islands; they extend for 4 miles **N.** from Point Rothsay; the river channel runs through the group.

**Sergieff Island** lies **SE.** of Farm Island, and is connected with it by a low marsh. It is of moderate height, and on it is a cultivated farm belonging to the Presbyterian mission at Wrangell.

**Blaquiere Point** is the eastern point of Mitkof Island; it is  $6\frac{1}{2}$  miles **W.**  $\frac{1}{2}$  **S.** from Green Point, and is a bluff, wooded point, rising rapidly back to the higher land; 3 miles **W.** of it is Manzanita Peak, about 4,000 feet high.  $3\frac{1}{2}$  miles **SSW.**  $\frac{1}{2}$  **W.** from the point is the **N.** point of a broad open bight in Mitkof Island; from this point to the **S.** point of Rynda Island is the southern limit of the mud flat on this side. **Sergieff Island** is  $3\frac{1}{2}$  miles **NE.** by **E.** from Point Blaquiere.

**Kadin Island** is  $2\frac{3}{4}$  miles **W.** by **N.** from Point Highfield; it is 2 miles long **N.** and **S.**, and a mile wide, and is about 1,500 feet high.

**Rynda Island**, 2 miles **W.** from Kadin Island, is larger and about the same height.

**Grey's Island** lies about  $\frac{1}{4}$  mile to the **SE.** of Rynda Island. It is about  $\frac{3}{4}$  mile long and  $\frac{1}{4}$  mile wide, and nearly 300 feet high. In the narrow passage between these islands the depth is less than 3 fathoms, and the southern limit of the mud flat is on a line between this island and Kadin Island.

**Liesnoi Island**, small, round, and of moderate height, lies  $\frac{3}{4}$  mile **S.** of Kadin Island, with a probable clear channel between.

The southern limit of the mud flat **E.** of Kadin Island is on a line between the **S.** end of that island and a point on the mainland 2 miles below Green Point.

In 1887 the entrance to the Stikine River channel was about midway between these points.

**Wilson Islands** are two small islets lying **W.** of Rynda Island and about  $\frac{1}{2}$  mile off the Mitkof Island shore.

**Sokolof Island** lies **S.** of Rynda and Grey's Islands, and is separated about  $\frac{5}{8}$  mile from the latter; it is about 2 miles long **E.** and **W.**, and of moderate height.

**Vank Island**, **S.** of Sokolof Island, with a channel between them of  $\frac{3}{8}$  mile in width, is about 3 miles long **E.** and **W.**, and  $1\frac{1}{2}$  miles wide, and is from 400 to 500 feet high. The channel between Zarembo and Vank Islands is about  $1\frac{3}{4}$  miles wide.

Between the western ends of Vank and Sokolof Islands, and nearly in mid-channel, is a small rocky islet showing one or two scraggy trees; it is called Two Tree Islet, and it may be passed on either side.

About  $4\frac{1}{4}$  miles **W.**  $\frac{1}{4}$  **S.** from Point Highfield, and  $1\frac{3}{4}$  miles **NW.**  $\frac{1}{2}$  **W.** from Woronkofski Point is a small bluff islet, called Five Mile Islet; it has deep water close-to.

All of these islands are heavily wooded.

Proceeding to or from Wrangell, a vessel may take either of the channels between Zarembo, Vauk, Sokolof, and Grey's Islands. The mail steamers usually take the southern one between Zarembo and Vank Islands. The middle one, between Vank and Sokolof Islands is narrower but is most direct. The northern channel, between Grey's and Sokoloff Islands, is rather out of the direct route; should a vessel require to go through it the shores of the latter island should be favored.

**Woronkofski Island** has already been partially described. **N.** and **S.** across the middle of the island is a range of mountain peaks over 3,000 feet high. The shores are bold and fringed by narrow ledges. At about the middle of the **N.** side of the island a reef projects about  $\frac{1}{4}$  mile from shore.

**Woronkofski Point** is the **NW.** point of the island; it is rather bluff, with lower land to the eastward of it. From Wrangell it has the appearance of an enormous elephant's head.

The waters surrounding the islands just described are deep and navigable. Midway between Vauk and Zarembo Islands are soundings of 10, 19, and 17 fathoms, showing a bank about  $1\frac{1}{4}$  miles long **E.** and **W.**, but nothing indicating a less depth of water has been noted.

#### SAILING DIRECTIONS.—POINT HARRINGTON TO WRANGELL.

A course **NW.**  $\frac{1}{2}$  **W.** up Clarence Strait, after passing 1 mile **W.** of Lincoln Rock, would be a mid-channel course between Point Harrington and Key Reef. When Point Harrington bears **NE.** by **E.**, distant  $1\frac{3}{4}$  miles, the reef will have been passed.

From that point, if desiring to pass to the westward through Snow Passage, steer **W.** by **N.** to pass Point Nesbitt, distant  $\frac{1}{2}$  mile. When that point bears **N.** the vessel is past the dangerous Nesbitt

Reef, and a course may be laid for mid-channel of the passage. In Snow Passage the ebb current runs from 4 to 6 knots to the eastward.

Wishing to enter Stikine Strait, when off Point Harrington, as above, steer **N.  $\frac{1}{2}$  W.** till midway between Zarembo Island and the opposite shore of Etolin Island; thence a **NE.  $\frac{3}{4}$  N.** course carries in mid-channel into Stikine Strait, until Round Point bears **NW.**, when a **N. by W.** course carries clear through the strait. When midway between Vank Island and Woronofski Island, the course to Etolin Harbor will be **NE.  $\frac{1}{2}$  N.**

A course in mid-channel through Chichagof Pass and the **NW.** end of Zimovia Strait will have about the same distance as by the courses just described.

If bound to the westward from Wrangell a course **SW.  $\frac{1}{4}$  W.** may be laid to pass to the southward of Vank Island, or **W SW.  $\frac{1}{8}$  W.** to pass between Vank and Sokolof islands.

Mitkof Island forms the northern shore of the eastern part of Sumner Strait. From Blaquiere Point to Point Alexander, a distance of 15 miles, the shores are somewhat irregular, curving gradually to the westward, with an occasional outlying ledge moderately close to shore. Six miles **SW.** from Point Blaquiere a shallow inlet enters Mitkof Island about 3 miles to the **NW.** It is about 1 mile wide, having a low sand island at its entrance. It is called Blind Slough,\* and is too shallow to be of use except to very small craft having local knowledge.

Station Islet lies 4 miles **W.** by **S.** from Vank Island and  $\frac{1}{4}$  mile off the Mitkof Island shore. There is a  $6\frac{1}{2}$ -fathom channel **N.** of the island, but it is not recommended.

Point Alexander, the **SW.** point of Mitkof Island, is the **E.** point of entrance to Wrangell Strait. It is quite steep and rocky, and a ledge, which partly uncovers at low water, makes out a little more than  $\frac{1}{8}$  mile to the **W SW.** from it.

Zarembo Island has been partly described. From South Craig Point the northern shore rounds gradually to the westward for 6 miles to Craig Point, which lies about 3 miles **S SW.** from the **W.** end of Vank Island. It is a broad, rounded projection, steep and thickly wooded, with a rocky ledge extending less than a cable off shore. For 3 miles to the eastward of the point a rocky beach extends out at low water about  $\frac{1}{8}$  mile; thence to South Craig Point the water is deep and the shores bold-to.

Westward from Point Craig the shore trends to the **SW.**, and about 1 mile from the point are two wooded islets and several rocks, lying about  $\frac{1}{8}$  mile off shore.

Baht Harbor.—About 3 miles to the westward of Point Craig is a broad, open bight, affording a good anchorage in **SE.** weather. The anchorage is in the middle of the bight in 8 to 12 fathoms, 2 or 3 fathoms off shore. At high water the navigator should not seek less than 12 fathoms.

From Baht Harbor the coast trends **W SW.  $\frac{3}{4}$  S.** with small projecting ledges and points for 3 miles to Low Point, when it suddenly turns to the **S SE.** for  $1\frac{3}{4}$  miles, and then as abruptly again to the **W SW.** for  $1\frac{1}{2}$  miles to Point St. John. In the angle thus formed are several islands and rocks, and it has received the name of St. John Harbor.

This harbor is at the extreme **NW.** end of Zarembo Island. It is formed by the group of islands lying in the deep angle **N.** of Point St. John. The two principal islands, called Northerly and Southerly islands, respectively, lie  $\frac{1}{8}$  mile apart, **W NW.** and **E SE.** The anchorage is to the eastward of them. Two large bare rocks lie off the **NW.** side of Northerly Island, with several rocks showing at low water and marked by kelp just outside them.

The Astronomical Station of the survey was on the westernmost bare rock, and is in—

Latitude .....	56° 26' 55" N.
Longitude .....	132° 58' 02" W.

Variation 29° 45' **E.** in 1886.

About  $\frac{1}{8}$  mile **S SW.** from Northerly Island is a group of rocks which show at low water. But few soundings were taken on the **S.** and **W.** sides of these islands, and some rocks are known to exist; therefore vessels seeking this harbor should enter between Northerly Island and Low Point.

The shores of Zarembo Island, in this vicinity, are low for about 1 mile back, thickly wooded, and with a valley extending in an easterly direction into the island.

Northerly and Southerly Islands are about 150 feet high to the tops of the trees. There is another small island near the head of the harbor, and at the bottom of the bight, forming the harbor, is an extensive mud flat and a low projecting peninsula.

#### DIRECTIONS FOR ST. JOHN HARBOR.

Enter midway between Low Point and Northerly Island on a course **SE.  $\frac{1}{2}$  S.** Anchor in about 12 fathoms, muddy bottom, when the **NE.** end of Northerly Island and the **N.** end of Southerly Island come in range; this will be midway between the middle of Southerly Island and the opposite shore of Zarembo Island.

This harbor affords good shelter.

Tides.—It is high water, full and change, at 0<sup>h</sup> 35<sup>m</sup>, with a mean rise and fall of 14 feet. Spring tides rise, approximately, 23 feet.

\*This slough was formerly supposed to connect with Wrangell Strait, but it is now known that high land lies between.



## THE KASHEVAROF ISLANDS, AND KASHEVAROF AND SNOW PASSAGES.

Between Zarembo Island and Prince of Wales Island, westward of a line between Point Nesbitt and Coffman Island, previously described, is a group of large islands, with many smaller ones, called the Kashevarof Islands, and two large island scalped Thorne and Stevenson islands, respectively, lie close to the Prince of Wales Island shore.

Between the latter two and the Kashevarof group is Kashevarof Passage, connecting Clarence Strait and Sumner Strait. This passage is wide but is so beset with rocks, reefs, and shoals, with strong tides and heavy tide rips, that no vessel should undertake to go through it. At its southeastern entrance there are so many rocks that a description would be confusing, and to the northward and westward of Thorne Island, where the passage contracts to about 1 mile in width, the sunken rocks are so numerous that the steam launches employed in the survey were obliged to proceed with the greatest caution, and it is probable that many rocks exist that were not located by the survey.

The Kashevarof Islands are all low and wooded, though there are many small bare rocks.

**Snow Passage** lies between Bushy Island, the northernmost of the Kashevarof group, and Zarembo Island. It is a deep channel about  $\frac{1}{2}$  mile wide, but which on account of the strong tides should be used with caution.

From Point Nesbitt to Point McNamara the **SW.** shore of Zarembo Island extends in a general **W.** by **N.** direction. It is low and wooded, and is fringed with rocks and ledges, extending out in some places nearly  $\frac{1}{2}$  mile. Off the north end of Bushy Island is a reef, extending out nearly 1 cable, and off Point McNamara a reef extends out nearly  $\frac{1}{4}$  mile, and a *still* larger reef extends **NW.**  $\frac{1}{2}$  **W.** from that point about 1 mile, and is  $\frac{1}{4}$  mile off shore. At slack water these reefs usually show kelp.

To the **NW.** of the Kashevarof group, a passage about  $3\frac{1}{2}$  miles wide and but little obstructed, extends for 6 miles to Sumner Strait.

Tide Island, very small, with deep water close to, lies nearly in the center of this passage.

**Rookery Islands**, two in number, low and scrubby, lie near mid-channel at the **NW.** end of the passage,  $1\frac{3}{4}$  miles **SW.** by **S.** from Point McNamara; **W.** by **N.** from the Rookery Islands,  $2\frac{3}{8}$  miles off the southern shore, is a small, low, rocky islet, with a sunken rock  $\frac{1}{4}$  mile **SE.**  $\frac{1}{2}$  **S.** from it. This rocky islet bears **NE.** by **E.**  $\frac{1}{2}$  **E.**  $1\frac{1}{4}$  miles from Point Colpoys, the **N.** point of Prince of Wales Island.

## TIDES IN SNOW PASSAGE.

The tides here are somewhat peculiar. The first of the flood flows to the eastward with a strength of about  $1\frac{1}{2}$  knots; the increasing flood tide from Clarence Strait finally overcomes that from Sumner Strait, and the last of the flood flows to the westward with a strength of about  $1\frac{1}{2}$  knots.

The ebb flows to the eastward from 4 to 6 knots an hour.

The same peculiarity occurs at the **NW.** end of Kashevarof Passage.

Southwest of the Kashevarof Islands the shores of Prince of Wales Islands are much indented with inlets and coves.

Salmon Bay lies **SW.** by **S.**  $1\frac{1}{4}$  miles from Rookery Islands, and  $2\frac{1}{4}$  miles to the **E SE.** of Point Colpoys. A salmon cannery has been located at this place. There is no anchorage here, though in good weather the steamer finds holding ground for a sufficient time to receive or discharge freight.

About  $1\frac{1}{2}$  miles **NW.**  $\frac{3}{4}$  **N.** from Point McNamara is a sharp projecting point where the western shore of Zarembo Island turns to **N.**  $\frac{1}{4}$  **W.** for  $4\frac{1}{2}$  miles to Point St. John. The shores are low and rocky, with ledges extending some distance off shore.

**Vichnefski Rock** lies  $\frac{1}{4}$  mile **NW.** of Point St. John. It is a long, low, black rock, and is sometimes awash at extreme high water. It constitutes a considerable danger to navigation at that point. It is on the range of Low Point, of St. Johns Harbor, and Station Island, so that range kept well open always clears the rock. From Vichnefski Rock a ledge, partly bare at low water, extends to the eastward nearly  $\frac{1}{2}$  mile, and the passage between the rock and Point St. John should not be attempted.

**Snow Passage** can be profitably used by vessels bound from or to Wrangell Strait, or between Clarence and Sumner straits, and not desiring to touch at Wrangell, as it is shorter than the route through Stikine Strait.

## DIRECTIONS FOR SNOW PASSAGE.

Steering **W.** by **N.** from off Point Harrington, when Point Nesbitt bears **N.** 1 mile, the dangerous Nesbitt Reef will have been passed, and a mid-channel course should then be followed, slightly favoring the **NE.** shore of Bushy Island when abreast its central point, to avoid the ledges making off from Zarembo Island, and when past this point hauling over to the **N.** shore to avoid the ledge off the **N.** end of Bushy Island.

Both shores of this passage are fringed with projecting ledges, some of which are  $\frac{1}{4}$  mile off shore, and in a strong tide care should be taken to prevent sheering.

When past the **N.** end of Bushy Island a **W.** by **N.** course carries midway between Rookery Islands and Point McNamara, and clear into Sumner Strait.

If bound to Wrangell Strait.—When Rookery Islands bear **S.**, steer **N NW.**  $\frac{1}{4}$  **W.**, with Level Island right ahead until Station Island is well open of Low Point, when a **N NE.** course for 4 miles clears the dangers in that vicinity, and a course may be laid for Point Alexander.

**Level Island** lies NW.  $2\frac{1}{2}$  miles from Point St. John, Vichnefski Rock being on nearly the same bearing. The island is low and flat, and a cut near its center, filling at high water, forms two islands. The entire island is surrounded by reefs and kelp for  $\frac{1}{2}$  mile off shore, and the passage between it and Vichnefski Rock is thus narrowed to about  $1\frac{1}{2}$  miles.

**White Rock** lies 1 mile N. by E.  $\frac{1}{2}$  E. from the E. end of Level Island. It is about 15 feet high above high water, and will be readily recognized by its very white appearance and detached position. There is a rock which shows at low water,  $\frac{1}{2}$  mile SE. from White Rock, and two others close-to on its SW. side. There is no kelp on this first-mentioned rock, but there is a large patch of kelp about  $\frac{1}{4}$  mile to the eastward of it. A mile and an eighth SW.  $\frac{1}{2}$  W. from the western entrance point of Wrangell Strait, and  $\frac{3}{4}$  mile off shore, is a small bare rock.

These rocks constitute the only dangers on the N. side after passing Level Island.

#### PRINCE OF WALES AND ASSOCIATED ISLANDS.

#### THE COAST FROM CAPE MUZON TO CAPE DECISION.

Having detailed the interior navigation from Dixon Entrance to Sumner Strait, the Oceanic coast will next be reviewed. This part of the coast has been described only by the early navigators, and to them we are indebted for such information as has been gleaned from their descriptions and surveys, both often inaccurate. Until the regular survey reaches it, the information must of necessity be largely of an approximate character.

Cape Muzon has already been described on page 72.

**Point Cornwallis** lies 5 miles W.  $\frac{3}{4}$  S. from Cape Muzon. About midway between these points is a good-sized peninsula, connected with the mainland by a narrow neck. Between Cape Muzon and this peninsula are three islands lying very close to the shore and connected with it at low water; between Point Cornwallis and this peninsula is a shallow bight, called Liscome Bay. This bay has not been examined, but it is known to be much smaller than given on the old charts. Point Cornwallis is a low projecting point, with a low, round-topped hill immediately back of it, and higher land still farther back.

To the westward of Liscome Bay a peculiar bare, reddish cone of solid rock projects from the surface of a large, smooth, rotund hill, or mountain, near its summit, on the face toward Point Cornwallis. This cone is 500 or 600 feet high and 450 feet in diameter at its base.

There is possibly an anchorage on the E. side of Liscome Bay, under a point of the peninsula that makes out to the westward about  $\frac{1}{2}$  mile. At the bottom of the bay is a valley, in which is a small stream.

Point Cornwallis is in—

Latitude (Approximate).....	54° 41' 40" N.
Longitude (Approximate).....	132° 49' 00" W.

From this point the land appears to trend in a W. by N. direction for about 6 miles to Point Bazan, the southeastern headland of the bay of the same name. It appears from Tebienkoff's map to be a low, narrow point, projecting to the westward from the high land behind it, and heavily wooded. A ledge appears to extend to the westward nearly  $\frac{1}{2}$  mile from the point and to continue to the northward of it about  $\frac{1}{2}$  mile off shore. It is quite probable, judging from the results of the later surveys, that most of these rocks are really rocky or wooded islets.

**Cape Magdalena**, lying W NW.  $2\frac{1}{2}$  miles from Point Bazan, is the northwestern headland of Port Bazan. The bay is about 8 miles in depth to the NE. by N., with a large group of wooded islands near its head, and a large island, called Dolgoi Island, in the middle of the entrance. Two small islets lie about  $\frac{1}{2}$  mile off the SW. end of Dolgoi Island.

**Dolgoi Island** is high, wooded, narrow, and rather irregular. It is about  $4\frac{1}{2}$  miles long in a general NE. and SW. direction. The seaward extreme of this island is said to be a well-defined and peculiar landmark, of a whitish color, and readily distinguished at a long distance.

**Port Bazan** appears to have very irregular and indented shores, with numerous small bays and coves. The only part of Port Bazan that seems to have received any attention lies between Dolgoi Island and the SE. shore of the bay; foul ground is noted on either shore of this passage. Before entering this channel, between the island and the SE. shore, appears a sounding in 23 fathoms; a mid-channel course appears to carry in depths of 12 to 16 fathoms. In the narrowest part 7 to 9 fathoms are noted, and the anchorage appears to be in about 17 fathoms in a good-sized cove just beyond a prominent point on the SE. shore of the bay, about 4 miles within the entrance. It has been stated by some of the officers of the old Russian-American Company that SW. gales send a heavy swell into this bay.

**Point Magdalena** is said to be easily recognized by its high, white bluffs, and by a small island southward of the point and close in shore.

**Cape St. Augustine** is 7 miles W NW. from Cape Magdalena. It is a somewhat remarkable headland making out in a SW. by S. direction nearly 2 miles. It consists of a high, round mountain, sloping abruptly to a small nipple hill, which is separated from a low pyramidal knoll at the extreme end of the point by a low strip of sand. The entire point has a white, bluff water line.

This headland forms the southeastern extreme of Augustine Bay, an apparently deep, unexplored inlet, containing some islands, and extending in a northerly direction. It is probable that some of the inlets that indent the coast in this vicinity connect directly with Tlevak Strait.

**Forrester Island** lies SW. 14 miles from Cape St. Augustine. It is a large island, the center of which is about 1,500 feet high; it is readily recognized by its serrated appearance. It is about 4 or 5 miles long NW. and SE., and about  $1\frac{1}{2}$  miles wide. Its southeastern point is terminated by three small wooded islands.

**Lowrie Island** lies about  $1\frac{1}{2}$  miles northwestward of Forrester Island. Near it are two detached bare rocks. The NW. point of Forrester Island is terminated by a peculiar finger boulder, conspicuous for quite a distance.

From the SW., Forrester Island presents near its center a high, rounded peak, about 1,500 feet high; the eastern half slopes gradually away; the western half is a series of peaks. The island is steep at the sides, rising into high rounded knobs, densely wooded, and is occupied during the passage of the fur seal, by Indians from the adjacent shores.

**Wolf Rock**, of Vancouver, low and black, lies N. by W.  $\frac{1}{2}$  W., about 9 miles from Forrester Island. This barren islet rises but little above high water, and is represented as surrounded by rocks and breakers, extending off some distance. The entire reef would appear to be about 1 mile in extent. Midway between Wolf Rock and Forrester Island a sounding is recorded of 50 fathoms and no bottom.

A breaker was reported by Captain J. C. Hunter, commanding the P. C. steamship *Idaho*, in December, 1888, as lying inside Wolf Rock. From the bearings taken by Captain Hunter this reef, which is probably nearly awash at low water, lies about 5 miles E. by N.  $\frac{1}{4}$  N. from Wolf Rock. Captain Hunter passed to the eastward of this breaker.

From **Augustine Bay** the coast trends to the NW. by N. for about 16 miles to the entrance to **Meares Passage**, and thence by a sharp angle about 7 miles in a SW.  $\frac{1}{2}$  W. direction to Point Felix, the S. point of **Suemez Island**. In the bottom of the bight thus formed is the entrance to the narrow **Meares Passage**, leading to Port Refugio in Port Bucareli. Of this vicinity but little is known, except from the imperfect maps and descriptions of the early navigators.

**Cape Bartolomé** lies 12 miles NW.  $\frac{1}{2}$  W. from Wolf Rock. This cape is the SE. end of **Baker Island**; it is a long, high, and narrow tongue of wooded land, which for 8 miles from this extremity does not attain a width greatly exceeding 1 mile. At a distance of 3 miles from its extremity it attains a height of 1,500 feet, by a gradual rise in successive wave-like summits.

The general trend of the cape is about NW. and SE., and it is represented as having foul ground about 1 mile off its extremity.

**Cape Felix** lies 6 miles E. by N.  $\frac{1}{4}$  N. from Cape Bartolomé. It is described as a rather short, apparently bluff, wooded promontory, with an islet near it. About  $2\frac{1}{2}$  miles NE. of the cape is an inlet, about 1 mile wide, and extending to the northward about 3 miles. Three islets are represented as lying in this bay or inlet. One mile SE. of its entrance is shown a rock that covers at high water, and about 1 mile off the entrance to Meares Passage is also a rock showing at low water.

**Suemez Island** is one of the largest of an undetermined number of islands, which, in connection with Prince of Wales Island, unite in protecting the large body of water known as **Port Bucareli**.

This great group of islands can be but very imperfectly described until the data of a modern survey can be had, and, therefore, only its most general features will be touched upon.

The principal entrance to Port Bucareli lies between Capes Felix and Bartolomé, and consists of a sheet of water 5 or 6 miles in width and trending in a northerly direction for about 10 miles, where it is greatly expanded, with the large island of **San Juan Bautista** nearly in the center of the port.

The eastern side of this entrance is formed by **Suemez Island**, to the eastward of which is **Meares Passage**, of which but little is known. Port Bucareli is about 12 miles long N NE. and S SW., with an average width of about 7 miles. From this large body of water, branches make off to the eastward and to the westward, some of which communicate with the sea, and others form snug and landlocked harbors. Several passages exist that have not been explored; the principal one of these is **Ulloa Canal**, which, extending along the N. side of **Dall Island**, connects Port Refugio with Tlevak Strait. This passage has been used, but no positive information regarding it is obtainable. The only danger is said to be at the "rapids," about 11 miles from the entrance to Port Refugio. These rapids can only be safely passed at slack water; in the strength of the tide the current is very swift.

**Shakine Strait** is another probable important passage. It is as yet unexplored, and extends northwestward from the connecting waters of Port Bucareli.

**Port Santa Cruz**.—According to the Russian charts, published probably from the old Spanish manuscript, about  $3\frac{1}{2}$  miles above Cape Felix is an inlet about 2 miles in depth, with a reef in the middle of the entrance, and 16 to 24 fathoms inside, called Port Santa Cruz. It probably affords a good anchorage. From the same authority it is high water, full and change, at 12<sup>h</sup> 15<sup>m</sup>, and the rise and fall from 14 to 17 feet.

**Port Dolores**.—Separated by a rather narrow peninsula to the northward of Port Santa Cruz is Port Dolores, open to the northward. This bay appears to be about 1 mile wide and 2 miles in depth, with 8 to 10 fathoms of water near the shores, deepening probably in the middle of the bay. It was the usual anchoring place of the Russian traders.



Pt. Windham NW  $\frac{1}{2}$  S. 5 Miles.  
*(from U.S. Hyd. Office Chart No. 226)*



Forrester Island from the South and West.  
*(from a Sketch by E.F. Herenden.)*

The most northerly point of Suemez Island is called **Point Grego**. The most westerly point is known as **Point Arboleda**, and the S. entrance point of Port Santa Cruz as **Point Rosario**. Off **Point Arboleda** a reef extends to the westward nearly a mile. About 1 mile W. of **Point Grego** are the **Cabas Islands**, quite small, with apparently a channel inside.

**Port Refugio**.—On the NE. side of Suemez Island is a broad passage called **Port Refugio**. At its head it connects with **Meares Passage**, forming the eastern shore of Suemez Island, and with **Ulloa Canal**, which connects with **Tlevak Strait** and forms the northwestern shore of **Dall Island**. The NE. entrance point of **Port Refugio** is **Point Flores**; it is the western point of an island, which stretches nearly across the entrance to **Estrella Bay**. This latter bay appears to be a good harbor and well sheltered. The entrance to the northward of **Point Flores** is narrow and carries 5 fathoms, with an anchorage in 10 fathoms in the middle of the bay.

**Port de la Caldero** lies 3 miles to the northward and eastward of **Estrella Bay**. It is open to the northward. Beyond the port, to the northward and eastward, is a group of large and small islands, nearly closing the mouth of a broad, deep harbor, extending to the eastward, and containing many islands. The southwestern, and largest of the outside group, is called **Island de la Madre de D eos**.

**San Juan Bautista Island**, about  $4\frac{1}{2}$  miles long, NE. and SW., and 2 miles in width, lies in the center of **Port Bucareli**. An anchorage can be found in a bight on its NW. side. About 1 mile N. of the NE. point of the island is a wooded, rocky islet called **Balandra Rock**, and in the same direction, a little more than 1 mile from **Balandra Rock**, are two more rocky, wooded islets, called the **Balaena Rocks**. The three have received the local name of **Fish Egg Islets**.

**Egg Island**, large and wooded, lies northeasterly from **San Juan Bautista**, and less than 1 mile from the main shore of **Prince of Wales Island**, with a good channel between. From the NW. end of **Egg Island** a reef extends northwesterly to another island something more than 1 mile distant.

**Klavak Inlet** has its entrance to the northward of these rocky islets and W. of **Egg Island**. On its shores is a large cannery and sawmill and an Indian village. The entrance to the inlet is obstructed by the reef just mentioned, through which is a narrow, intricate passage leading inside. The reef consists of a series of detached rocks, five of which show at low water. The passage is between the second and third rocks from the eastward, and appears to be clear, with a least water of 3 fathoms on a patch about the middle of the passage.

The anchorage in the vicinity of the cannery is somewhat restricted in size. The entrance over the reef should not be attempted, without good local knowledge.

**San Alberta Bay** is that part of **Port Bucareli** lying to the NW. of **San Juan Bautista Island**. Besides the **Fish Egg Islets** it contains several small rocky islets; one called **Parida Rock** lies  $3\frac{1}{2}$  miles W. of **Balandra Rock**.

**Port San Antonio** is on the western side of the entrance, about 6 miles above **Cape Bartolom e**, a double-headed harbor, having 12 to 20 fathoms within, and a bunch of rocks and islets near its NE. headland, which is called **Point San Roch**. Three miles beyond this to the northward is **Port Assumption**, with deeper water and a sunken rock within the entrance, the NE. point of which is called **Point Maria**.

**Port de la Marina** lies about 4 miles to the northward of **Point Maria**, and has numerous rocks and large islands off its southern entrance point. The largest of these islands is called **St. Ignacio Island**, and the very small one to the southward of it is **Christina Islet**.

From the western end of **Port de la Marina** a narrow channel extends to the SW., and, containing many rocks, connects with the ocean through a large circular harbor, having a large island in its center, and called **Sea Otter Harbor**.

**San Nicolo Canal** connects **Port de la Marina** at its head with the **Gulf of Esquibel**, forming a large island, unnamed, the northern point of which is called **Point St. Gertrude**.

**Gulf of Esquibel** is separated from **San Alberto Bay** by the large island of **San Fernando**, the southeastern point of which is called **Point Amatgura**.

**Portillo Channel**, about 1 mile wide, in which are some islands and rocks, is to the southwestward of **San Fernando Island**. The least depth of water noted is 5 fathoms and the greatest depth 8 fathoms.

On the northern side of **San Fernando Island** is **San Cristoval Channel**, separating it from the mainland of **Prince of Wales Island**. On the N. side of this channel are one or more small islands; the largest is called **Keene Island**, and on the S. side, close in, is **Kelp Reef**. This channel is not wide, but it is quite safe, and is used by the steamers from the northward into **Klawack**.

On the NW. side of the **Gulf of Esquibel** are many islands, with passages between leading to the ocean; most of these are probably obstructed by rocks and reefs. The steamers having local knowledge always take a passage well to the northward, but the discrepancies of the charts are so great that it cannot be identified.

In the SW. part of the **Gulf of Esquibel** a passage leading to the ocean is called **Bocas de Arriaga**, and the broad passage leading to the NW. is called **Bocas de Finas**. On the N. side of the latter is **Tonowek Bay**, with a group of islands between. An anchorage is noted in a cove in the southeastern part of this bay. On the N. side of this bay are some islands; a passage on either side of the largest of these islands leads into **Shakine Strait**, of which little is known. It extends as far as **Shakan**, with

two intermediate openings into Sea Otter Sound to the eastward of Cape Pole. Northwest of these openings it takes the name of **Davidson Inlet**, and that part is known to be navigable only for boats at high water.

**Cape Addington** is described as a conspicuous promontory; it forms the extreme southwestern point of **Noyes Island**, which is the westernmost of the group separating Port Bucareli from the ocean.

From this cape the coast, consisting of the numerous islands that guard Port Bucareli from the sea, curves to the **N.** and **N NW**; it is much broken and is but little known. The northwestern termination of this curve is at Cape Pole, which bears from Cape Addington **NW.** by **N.  $\frac{3}{4}$  N.**, distant 32 miles. The waters in the bight thus formed has been called Iphigenia Bay. In the middle portion of the bight are numerous islets, rocks, and sunken reefs, lying to seaward of the main line of islands.

To the **E SE.** from Cape Pole is a bight several miles in length, and nearly filled with islands; on the **NW.** side of this bight Davidson Inlet connects with Shakine Strait. The southern part of this bight has been called **Sea Otter Sound**, and an anchorage is noted on the northern end of the largest island.

A group of two large and many small islands lie to the **SW.** of Cape Pole. The largest, known as Coronation Island, is  $10\frac{1}{2}$  miles **SW.** from the cape, and the other large one, called Warren Island, is about  $1\frac{1}{2}$  miles **S.** of the cape. A chain of small islands, called the Spanish Islands, extend for 4 miles **N NW.** from the **NE.** point of Coronation Island.

**Spanish Islands**, just mentioned, mark the entrance to Sumner Strait from the sea.

Steamers bound to Klawack from Sumner Strait take what is usually called the Inside Passage. This is close around Cape Pole, inside of Warren Island. Owing to the great inaccuracies of all existing charts, no particular description of the route can be given. The following general directions are those followed by the commanders of the Pacific Coast Steamship Company's steamers in Alaska, and were furnished by Captain W. E. George, pilot of the steamer *Idaho*.

**Directions.**—Passing between Warren Island and Cape Pole, steer **SE.  $\frac{1}{2}$  S.** for about 19 miles, to a prominent point named by the pilots Cape Lynch; thence **SE.** by **E.** about 3 miles to White Cliff and rock. From there an **E.** course for about 8 miles leads into San Cristoval Channel.

These courses will not plot on any chart, but they pass inside all the rocks and breakers except at a point halfway between Point Lynch and White Cliff, where a group of low rocks stand close to shore, and at White Cliff, where there is a clump of rocks close in.

Take a mid-channel course through San Cristoval Channel; the reefs show kelp. Pass to the northward of Parida Rock and leave the Fish Egg Islets to the eastward.

The passage over the reef and into Klawack is only safe with good local knowledge.

The outside passage through Port Bucareli is apparently clear. From the entrance to Port Estrella a **N.** course for 10 miles leads **E.** of the Fish Egg Islets to the reef at the entrance to Klawack.

### SUMNER STRAIT.

There are properly three entrances to Sumner Strait from the sea. The main entrance is between Warren and Coronation Islands, and is  $5\frac{3}{4}$  miles wide. The entrance between Warren Island and Cape Pole is  $1\frac{1}{4}$  miles wide, and that between Cape Decision and the Spanish Islands is 1 mile wide.

**Warren Island** is  $5\frac{1}{2}$  miles long **N NW.** and **S SE.**, and  $3\frac{1}{2}$  miles wide. It is mountainous and covered with trees. Off Point Borlase, the western point of the island, is a sunken rock which bears **SW.** by **S.**,  $\frac{1}{4}$  mile distant from the point; it is marked by a breaker only during a heavy swell. Rocks are visible about 3 miles **S.** of the Island, but that portion has not yet been examined. Warren Peak, the highest point on the island, is on the northern end; it is 2,140 feet high. This peak is the most conspicuous point from the northward after rounding Point Baker. It is wooded, and forms the northern termination of a ridge extending in a southerly direction toward a sharp peak 2,044 feet high, marking the southern end of the island.

**Coronation Island** is the largest of the islands at the entrance of the strait, and is of a peculiar hatchet like shape. It is 9 miles long **N NE.** and **S SW.**, and  $5\frac{1}{4}$  miles wide at its widest part. **Point Cora**, its **NE.** point, is 5 miles **SE.** by **S.** from Cape Decision. The island is wooded and mountainous, with two prominent peaks. **Pin Peak**, on the **NW.** part of the island, is 1,300 feet high, sharp and bare; on its **NE.** side it is very steep, and bare almost to the water's edge.

**Needle Peak**, near the center of the island, is 1,700 feet high; as seen from the northward it is the highest point of the island. It is wooded except the extreme summit. The shore line of the island is regular, with few projecting reefs, except along the **NW.** shore, where there are several bights and a number of rocks.

**Nation Point** is the **NW.** point of the island; it is bluff and bold close-to. Two miles **NE.** by **E.** is Aats Point; between these points are two bights; the western one, called **Egg Harbor**, lies at the foot of Pin Peak; it is  $\frac{3}{4}$  mile long and  $\frac{1}{4}$  mile wide at the entrance, and is a good anchorage for small vessels in 5 to 7 fathoms of water. It is a rendezvous for the Indians, who await favorable weather to go out to the Hazy Islands to gather eggs. The eastern bight does not afford an anchorage.

No particular directions are necessary for Egg Harbor, except to avoid a sunken rock and small bare islet lying  $\frac{1}{4}$  mile NW. of the point separating the two bights.

**Aats Point.**—Here the shore turns abruptly to the SE. by S. for 3 miles, and then to the NE. by N. for  $5\frac{1}{2}$  miles to Point Cora. In the bight thus formed are three deep coves; the western cove, called **Aats Harbor**, affords good anchorage near the head for small vessels; the middle bight, which closely adjoins Aats Harbor, has better water and affords anchorage for vessels of any size in 5 to 8 fathoms, sandy bottom; there is, however, in mid-channel between the entrance points of this bight, a sunken rock marked by kelp; there is a good passage on either side of the rock.

The eastern cove lies about a mile beyond the middle one; N. of this cove is a small island; in the cove are sunken rocks, and rocks and kelp extend out from its western shore.

About  $\frac{3}{4}$  mile NE. by E.  $\frac{1}{2}$  E. from Aats Point is a reef marked by kelp and another rock between it and the point, and at 1 mile NNW. from Aats Point is another rock which uncovers at low water, with a small bare islet close-to; this last rock is marked by kelp, and a breaker when there is any swell. These rocks are dangerous at night or in thick weather; otherwise, being marked by kelp, no particular directions seem necessary.\*

From the NE. extremity of Coronation Island a chain of islands extends to the NNW., in the direction of Cape Decision, called the Spanish Islands. There are many rocky islets and kelp rocks surrounding these islands, and  $1\frac{1}{2}$  miles W. of the southern one is a group of sunken rocks marked by kelp; the least water found on this patch was 12 feet; it is marked by a breaker during heavy swells.

There is a narrow 20-fathom passage between Coronation Island and the Spanish Islands, and between Cape Decision and these islands is a clear passage a mile wide.

**Hazy Islands** are 8 miles SW. from Coronation Island. They are four in number, one being detached and lying to the southward of the rest. The highest is the southernmost of the group of three, and is about 250 feet high.

Cape Decision, in—

Latitude.....	56° 00' 08" N.
Longitude.....	134° 07' 31" W.

is the W. point of entrance to Sumner Strait. It lies 11 miles W. by S.  $\frac{1}{4}$  S. from Cape Pole. It is a very conspicuous promontory and forms the southern extremity of Kuiu Island.

The western shore of Sumner Strait from Cape Decision trends generally to the NNW.  $\frac{1}{2}$  W. for 19 miles to the head of Affleck Canal.

**Point St. Albans**, a low, rocky point with many outlying rocks and reefs, is  $7\frac{1}{2}$  miles NE. by E.  $\frac{3}{4}$  E. from Cape Decision. It is the southeastern point of the long peninsula forming the eastern shore of Affleck Canal.

Between the two points, and  $3\frac{1}{2}$  miles NNE. from the latter, is Fairway Island, small, rocky, about 100 feet high and covered with trees; there are outlying rocks and a reef making out  $\frac{3}{4}$  mile SE. by S. from it. There is a clear passage 2 miles wide on both the N. and S. sides of this island.

**Port McArthur.**—At the entrance to Affleck Canal,  $4\frac{1}{2}$  miles NNW. from Cape Decision, is the southern headland of a small inlet called Port McArthur, and NW.  $\frac{1}{4}$  N. 1 mile from that is Point Lemon, its northern headland. This harbor is about  $1\frac{1}{2}$  miles long NW. and SE., and about  $\frac{1}{4}$  mile in average width. It is protected at the entrance by a group of islands and reefs, and affords an excellent shelter in all weathers; it has a sand beach and no outlying dangers. Off the principal points are narrow ledges showing at low water.

West of Port McArthur is McArthur Peak, 2,229 feet high. It is 5 miles NW. by W. from Cape Decision. The summit is sharp and bare; to the northward about 2 miles is Mount Howard, 2,340 feet high. It is 1 mile NW. by W. from the head of Port McArthur. Mount Howard is wooded and the summit covered with grass halfway down. As seen from the vicinity of Point Baker it is sharp and pyramidal in shape. From the eastern side of Sumner Strait it presents a green appearance and is a good landmark for the port.

North and South Islands are the only large ones of the group off Port McArthur. They are each about  $\frac{1}{2}$  mile in diameter, low and wooded, with surrounding ledges; they lie nearly  $\frac{1}{2}$  mile apart N. and S. Between them are half a dozen rocky islets and much kelp; between these islets and South Island, and close to the latter, 6 fathoms may be carried through the kelp. There is also a passage S. of South Island, but it is shoal and rocky, and should not be attempted without local knowledge.

About  $\frac{1}{4}$  mile W. of North Island are two rocky patches showing much kelp, and one or two low-water rocks in the southern patch. East of North Island nearly  $\frac{1}{2}$  mile are two kelp patches with dangerous rocks.

**Lemon Point** is low and rocky. A large islet and two small ones lie SE. of it close-to. North of Lemon Point numerous rocky islets lie off the shore all fringed with kelp, and NE. by N.  $\frac{3}{8}$  mile from the point is a kelp patch with a rock showing at low tide.

The entrance to Port McArthur lies between this rock and the reefs and kelp patches lying W. of North Island.

\* About  $2\frac{1}{2}$  miles NW.  $\frac{1}{4}$  W. from Nation Point the surveyors report that a breaker was seen after a southeaster; but afterward, on several occasions, when sounding in the locality, nothing was seen of it, the water being smooth.

## DIRECTIONS FOR PORT McARTHUR.

Pass either side of Fairway Island; bring Lemon Point open of the N. end of North Island, bearing **W SW.**, and steer that as a course until within 1 mile of North Island, when change to **W.** and keep that course until the **W.** side of North Island is in range with the projecting point of the **S.** entrance, from whence a **SSW.  $\frac{3}{4}$  W.** course carries in clear between the kelp patches. This course should bring the vessel's head exactly on the crown of a small detached hill about 250 feet high, on the **SW.** shore of the bay. When the harbor is well open haul in and anchor at discretion. The general depth of water in the port is about 16 fathoms.

**Tides.**—It is high water full and change at 12<sup>h</sup> 00<sup>m</sup>, with a mean rise and fall of 9 $\frac{1}{2}$  feet.

**Affleck Canal** is an inlet or arm of Sumner Strait. It is about 12 miles long **NNW.  $\frac{3}{4}$  W.**; the eastern shore has only two small indentations, lying close together about 5 miles within the entrance. The northern one only affords an anchorage for small vessels. Southwest  $\frac{3}{4}$  mile from the southern cove are two small rocks, and several others near to that are bare during the tide and are marked by kelp. Except these the **E.** shore is free from danger.

The **W.** shore is indented by two bays and a small cove about midway between them.

**Marble Islet**, named from its formation, marks the western entrance point of the canal; there are several other small islets near it.

**Bush Islet**, and a large high-water rock, lie 2 $\frac{1}{4}$  miles **NW.  $\frac{3}{4}$  N.** from Marble Islet. This locality is marked by kelp, in which are several sunken rocks, the most dangerous of which lies  $\frac{3}{4}$  miles **SE.** by **S.** from Bush Islet. Directly **NW.** from this islet is Kell Bay, so named by the Indians, the headlands of which are 1 $\frac{3}{8}$  miles apart **NNW.** and **S SE.**; the bay widens, and at its head are three coves.

There are several small islands and islets, as well as dangerous rocks of a peculiar soapstone color, scattered throughout this bay. The only good anchorage here is in the bight directly to the westward of the group of islands lying on the **S.** shore. This cove or bight has three small islets in it, and to the southward of these is the anchorage in 13 fathoms, soft bottom.

## DIRECTIONS FOR ENTERING KELL BAY.

To enter this anchorage steer a mid-channel course about **W SW.  $\frac{3}{4}$  W.** into the bay, until **McArthur Peak** is just open of the **W.** side of the islets in the cove. Steer this range as a course until past the islets, when haul around to **E NE.** and anchor.

This anchorage is perfectly landlocked, but is only suitable for small vessels.

But few of the rocks in Kell Bay are marked by kelp and the entire ground is exceedingly treacherous.

About 2 $\frac{1}{4}$  miles above Kell Bay is a cove which does not afford an anchorage. About 1 $\frac{1}{4}$  miles above this cove is the entrance to Bear Harbor, an indentation having three arms, the middle arm only affording good anchorage to small vessels. The entrance to the middle and western arms is nearly closed by a small island and several rocks above water. The entrance is to southward of the island. On the **E.** side of the entrance to the middle arm are several small islets. Vessels may anchor in the western arm.

From Bear Harbor the canal narrows to  $\frac{1}{2}$  mile, forming a neck about 1 mile long, then widening out again to one mile and narrowing toward the head, where there is a fair anchorage, but not desirable, as the bottom is rocky and uneven.

**Point St. Albans** is 7 $\frac{1}{2}$  miles **N.** by **E.  $\frac{3}{4}$  E.** from Cape Decision. It is a low rocky point, and from it two dangerous reefs make out, one 1 $\frac{1}{8}$  miles **NE.** by **E.**, and the other 1 $\frac{1}{4}$  miles **S.** by **E.** Both are marked by heavy kelp.

**Point Amelius** is 7 $\frac{1}{2}$  miles **N.** by **W.  $\frac{3}{4}$  W.** from Point St. Albans. Between these points are a multitude of rocks and wooded islets. About 1 $\frac{1}{2}$  miles **E NE.** from the easternmost island (the third one from Point Amelius) is a patch of whirlpools and tide rips. Eight fathoms was the least water noted here, but it may contain pinnacle rocks and should be avoided.

To the westward of Point Amelius is a bight in which a vessel may anchor in 16 fathoms. The western part of this bight is a shoe-shaped cove, in which small vessels may find good anchorage in 3 to 5 fathoms. The entrance to the anchorage in this bight would be a **NW.** by **W.** course, mid-channel, to the westward of the three islands lying **SE.** from Point Amelius; when inside the point anchor at discretion. There is a clear passage on all sides of these islands.

**Port Beauclerc.**—The entrance to this port is 11 miles above Point St. Albans. It is marked by Beauclerc Island, lying near the middle of the entrance. This island is low, wooded, and rocky, with a few outlying bare rocks on its northern side, and a reef making out  $\frac{1}{2}$  mile **E.** by **N.** from it.

At about 2 miles within the entrance Port Beauclerc expands and forms a large bay, nearly triangular in form. There are several islands within the bay; the largest, called Edwards Island, is a little more than 1 mile square, rectangular in form, and covered with trees. It is 3 $\frac{1}{2}$  miles from Beauclerc Island, and lies close to the southern shore, with a narrow but clear channel **S.** of it. The other islands lie **NW.** of it along the western shore.

There are three anchorages noted in Port Beauclerc; the one most easy of access is at the **NW.** angle of the bay, 7 $\frac{1}{2}$  miles from Beauclerc Island. The anchorage is on the **W.** side of the head in about 17 fathoms.



The southern angle of the bay affords a good anchorage, but it is somewhat difficult of access; enter by the narrow passage S. of Edwards Island. Keep a mid-channel course to the southward, and anchor in 10 fathoms about the middle of the reach.

There is also an anchorage in the bight to the westward of the island lying W. of Edwards Island.

A fourth anchorage, in  $12\frac{3}{4}$  fathoms, muddy bottom, is also noted in a bight on the N. shore,  $1\frac{3}{4}$  miles above the N. entrance point.

In entering the southern harbor care should be taken to avoid the sunken rock, having 18 feet on it at low water, lying 1 mile SW.  $\frac{1}{2}$  W. from the W. end of the narrow passage S. of Edwards Island.

Beauclerc Peak, on the southern shore of the port, is 2,500 feet high; it is not easily distinguishable from the southward. From the northward, after rounding Point Baker, it is the most prominent peak on the western shore. It has a scant growth of trees and apparently a deep crevice in the top, which is generally filled with snow.

Boulder Point lies 4 miles N NW.  $\frac{1}{2}$  W. from Beauclerc Island. It is a steep, bold point, with numerous rocky islets close in shore. At this point the shore turns to the westward for  $4\frac{1}{4}$  miles to Reids Bay, an indentation  $1\frac{3}{4}$  miles wide and 2 miles deep, with two islets and several outlying rocks along its N. shore, and a sunken rock S. of the islets and in mid-channel. An inferior anchorage may be had inside the islets.

Sumner Island lies 4 miles N. by W.  $\frac{1}{2}$  W. from Boulder Point. It is of irregular shape, about  $1\frac{1}{2}$  miles long and  $1\frac{1}{4}$  miles wide, and surrounded by a large number of small islets and rocks, which extend to the land on the westward. Midway between Sumner Island and Reids Bay is a group of sunken rocks covered with kelp.

Strait Island, in the middle of Sumner Strait, is  $2\frac{1}{4}$  miles E NE.  $\frac{1}{2}$  E. from Sumner Island. It is low and wooded, 1 mile long E. and W. and  $\frac{1}{2}$  mile broad, and at high water forms two islands. It has some rocks close-to, and a reef makes out S SE. from it  $\frac{1}{2}$  mile.

At this point Sumner Strait takes a sharp turn to the E NE.

Northwest from Strait Island is the opening of Keku Strait, sometimes called Rocky Passage, leading to the northward and westward about 35 miles and connecting with Chatham Strait. It has not been surveyed, but it is known to contain many rocks, and may only be safely navigated at high water.

The E. shore of Sumner Strait from Cape Pole, the SW. extreme of Kosciusko Island, trends N.  $\frac{1}{2}$  E. for 8 miles to Ruins Point, and is quite steep and irregular, with a number of rocks and islets extending half a mile off the shore, which is fringed with kelp. In a bight just to the northward of the point of Cape Pole is a snug anchorage for small vessels; the entrance on the S. side is marked by a reef of rocks and on the N. side by an islet.

Ruins Point is the S. entrance point of Shipley Bay, an arm of Sumner Strait running to the E NE. about 6 miles, with an average width of about  $1\frac{1}{4}$  miles.

Bluff Island is a small, steep island, about 200 feet high, off the middle of the entrance to Shipley Bay. An islet and a reef extend  $\frac{1}{4}$  mile off its western side. One mile E. of the S. end of Bluff Island, and  $\frac{3}{4}$  mile from the S. shore of Shipley Bay, is a dangerous sunken rock, with 3 feet of water on it at low water and deep water close-to; it is marked by kelp. Along the N. shore of the bay,  $1\frac{3}{4}$  miles from Bluff Island, and extending  $\frac{3}{4}$  mile off shore to the SE., is a reef of rocks, partly showing at low water, and marked by kelp and having deep water close-to. There is also an islet and a rock close to the N. shore. The N. shore is clear after passing these rocks, with good anchorage near the head of the bay in 14 fathoms, muddy bottom.

On the S. side of the bay, about  $\frac{2}{3}$  its length, is a moderately deep bight, with a prominent projecting point on its eastern side. A small islet and some rocks, showing kelp, lie close to the N. of this point, and on its W. side are also two small islets and some rocks. On the line between the S. end of Bluff Island and this point, and 1 mile from the latter, is a rock that covers at high water, and is marked by kelp.

#### DIRECTIONS FOR SHIPLEY BAY.

Enter in mid-channel to the northward of Bluff Island, steering E SE.  $\frac{1}{4}$  S. until The Nipples bear NE.  $\frac{1}{4}$  N., when steer that as a course and follow the N. shore, anchoring at discretion at the head of the bay.

#### SHAKAN BAY.

Three miles to the northward of Bluff Island is Shakan Bay. The shore between Shipley and Shakan bays is broken and very foul. A group of small islands mark the SW. entrance point of the bay, with sunken reefs extending  $\frac{3}{4}$  mile to the westward of them, and all marked by heavy kelp.

The S. shore of Shakan Bay is clear with the exception of rocks lying close-to, while the entire northern part of the bay is foul for  $1\frac{1}{2}$  miles off shore; the reefs are all marked by heavy kelp. Shakan Bay has no anchorage, but in the SE. angle is the narrow southern entrance to Shakan Strait, a narrow strip of water from a  $\frac{1}{4}$  to  $\frac{3}{4}$  mile wide, and about  $8\frac{1}{2}$  miles long, being of the general shape of a horseshoe surrounding a group of large islands, and connecting by several entrances with Shakan Bay.

**Hamilton Island**, the largest of the group surrounded by Shakan Strait, separates the southern and middle entrances. This island is about  $4\frac{1}{2}$  miles long **NE.** and **SW.**, and  $1\frac{1}{2}$  miles wide at its widest part. It has the general shape of a half horseshoe. On its southern side is a range of hills from 1,100 to 1,600 feet high.

**Middle Island**, the second in size of the group, separates the middle and northern entrances. It is about  $1\frac{1}{2}$  miles long **NW.** and **SE.** and  $\frac{3}{4}$  mile wide, with hills of 500 to 900 feet in height.

**Divide Island**, immediately inside the Middle Entrance in the bight of Hamilton Island, is about 1 mile long and  $\frac{1}{2}$  mile wide, and of the same character as Middle Island; all are heavily wooded.

The main entrance to Shakan Strait is along the southern shore of Shakan Bay, **S.** of Hamilton Island, and is clear to vessels of any draught by keeping in mid-channel. Vessels entering from Sumner Strait, either **N.** or **S.**, will not fail to recognize the locality by the group of small, rocky islets previously mentioned, and lying about 3 miles **N.** of Bluff Island.

At the entrance Shakan Strait is narrowed to a little more than an  $\frac{1}{8}$  mile by a rocky ledge on the **SW.** point of Hamilton Island, and another on the opposite shore of Kosciusko Island, both marked by kelp. At this point is a bar with a least water of 6 fathoms. A mid-channel course carries in clear of all dangers.

From this entrance Shakan Strait curves gradually to the northward, having a general width of about  $\frac{1}{2}$  mile, with rocky shores and a general mid-channel depth of 20 to 30 fathoms.

Three and a half miles from the entrance the strait suddenly widens into a bay, about  $\frac{3}{4}$  mile square, containing a good anchorage in 7 to 9 fathoms, mud bottom. At the **SE.** angle of this bay is an Indian village; also a wharf and saw mill, called Hamilton's Mill, from the original owner. From here lumber is shipped to various points in Alaska, and also to San Francisco. The anchorage is with the saw mill bearing about **E.  $\frac{1}{2}$  S.**, and from  $\frac{1}{8}$  to  $\frac{1}{4}$  mile off shore.

South of **Shakan Village**, and overlooking the harbor, is a high double-peaked mountain, called **The Nipples**. The **E.** peak is 2,900 and the **W.** peak is 2,450 feet high; the tops are rounded and covered with a small growth of trees and grass, and nearly always show more or less now. Entering Sumner Strait between Cape Decision and the Spanish Islands, **The Nipples** are visible to the northward of Mount Francis.

In **Shakan Strait**,  $\frac{3}{4}$  mile **NW.** from **Shakan Village**, is **Fontaine Island**, low and wooded, having a clear passage on each side;  $\frac{3}{4}$  mile **N.** of the village is the northern entrance to **Davidson Inlet**, known locally as **Klawak Inlet**, leading to the southward into **Sea Otter Sound**. This passage has not been surveyed, but it is known to be navigable only for boats and at high water. It separates **Kosciusko Island** from **Prince of Wales Island**.

About  $\frac{1}{4}$  mile above **Fontaine Island** is a small, rocky islet, having a shoal extending a little more than  $\frac{1}{2}$  mile **SE.** by **E.** from it. There is a passage on either side of the shoal.

From **Fontaine Island** the strait turns gradually to the northward and westward for 2 miles, when it expands into a large bay, along the shores of which are some rocks and islets, and in which an anchorage may be found anywhere, except in the southern angle, where the water is deep. In the southern part of this bay **Divide Island** separates the middle entrance into two branches, that between **Divide Island** and **Middle Island** being the only one navigable, except for boats. This middle entrance is very narrow and with strong currents. All dangers are well marked by kelp.

Northwest of **Middle Island** is the northern entrance to **Shakan Strait**. It is only navigable for small launches and boats.

**Tides.**—At **Shakan** it is high water, full and change, at 0<sup>h</sup> 16<sup>m</sup>, with an extreme rise and fall of  $13\frac{1}{2}$  feet. Magnetic observations show that the mountains in the vicinity of **Shakan** contain much iron.

The **Barrier Islands** mark the **NW.** entrance point of **Shakan Bay**. These are two islands with numerous rocks and islets lying around and between them; a reef extends  $\frac{3}{4}$  mile **S SE.**  $\frac{1}{2}$  **E.** from the western one.

**Calder Rocks.**—Near the middle of **Sumner Strait**, **W NW.**  $\frac{3}{4}$  **W.**  $1\frac{1}{2}$  miles from the **Barrier Islands**, and **E NE.**  $\frac{3}{4}$  **E.**  $4\frac{3}{4}$  miles from **Beaulerc Island**, lies the southernmost of the **Calder Rocks**, a dangerous reef extending  $1\frac{1}{2}$  miles in a **NW.**  $\frac{3}{4}$  **N.** direction, and about  $\frac{3}{4}$  mile in width; this rock bares at half tide;  $\frac{3}{4}$  mile to the **NW.** is another rock that bares only at low water, and  $\frac{1}{4}$  mile further to the **NW.** is another rock that never uncovers, but is marked by a breaker when there is much swell. This northernmost of the **Calder Rocks** lies on the range of **Beaulerc Island** and **Beaulerc Peak**. These rocks are marked by kelp, and the water is deep close-to.

There is a good passage on each side of these rocks, but that to the westward is generally used as being most convenient.

A vessel might find an anchorage in the bight **N.** of the **Barrier Islands**, but it is not recommended.

**Mount Calder**, to the **NE.** of **Barrier Islands**, on **Prince of Wales Island**, is 3,371 feet high; it is the most prominent peak seen from **Sumner Strait**. It is bare of trees and very sharp. From the vicinity of **Point Baker** it presents a double peak, the eastern one being the higher. From the westward a sharp peak is seen to the northward of **Mount Calder** and about 500 feet less in altitude. A ridge runs from **Mount Calder** to the northwestward toward **Labouchere Harbor**. From the southward **Mount Calder** has more of a round shape and shows but one peak. The **S.** side of the mountain is covered with grass between the bare top and the timber line 1,000 feet below.

On the **E.** shore of Sumner Strait, about  $2\frac{1}{2}$  miles above the Barrier Islands, is the Hole-in-the-Wall, a small cove, the entrance of which is through a narrow neck  $\frac{1}{2}$  mile long, between high, perpendicular white bluffs, which opens into a circular basin  $\frac{1}{2}$  mile in diameter. There are two rocks in the entrance to the neck, which at low water have only 4 feet on them. The depths in the basin are from 8 to 11 fathoms, muddy bottom, and bold shore, and it is a good anchorage for small craft.

**Labouchere Island**,  $4\frac{1}{2}$  miles **N NW.**  $\frac{3}{4}$  **W.** from Barrier Islands, is a small, rocky islet partly covered with grass. It is the westernmost of a group of islets lying off the entrance to Labouchere Harbor. This harbor is  $\frac{3}{4}$  mile wide at the entrance and  $1\frac{1}{2}$  miles deep; it is studded with rocks and islets, the entrance being nearly closed by three rocks that are marked by kelp. It is not recommended as an anchorage, and no sailing directions are given.

One mile **N.** by **W.**  $\frac{1}{2}$  **W.** from Labouchere Island is a bold, white bluff 150 feet high, and  $1\frac{1}{2}$  miles **N.** by **W.** from this bluff is the southern entrance point of Port Protection.

**Port Protection** has a general **E SE.** direction, and is about  $2\frac{3}{4}$  miles long. It is  $1\frac{1}{2}$  miles wide at the entrance, contracting to less than  $\frac{1}{2}$  mile at its head. From the southern point of Straits Island the entrance to Port Protection bears **SE.** by **E.**  $\frac{1}{2}$  **E.**, distant  $3\frac{1}{2}$  miles.

The soundings in the bay are very irregular and the bottom is more or less rocky. A little more than 1 mile inside the bay it contracts to less than  $\frac{1}{2}$  mile in width. On the **N.** side is a cove, nearly  $\frac{1}{4}$  mile square, lying to the northward of the high-water island, connected with the projecting point that contracts the bay. There may be an anchorage in this cove, but the soundings indicate great irregularity of bottom, and it is not recommended. A chain of islands extending **E SE.** and **W NW.** divides the upper portion of the bay. There are several channels through this chain of islands; the widest one, between the two largest islands, has a dangerous sunken rock exactly in mid-channel. There is good anchorage on each side of these islands; the best is probably on the **S.** side, in about 11 fathoms, off the passage between the two largest islands.

At the extreme head of the bay is a group of islets, connected at low water, and separating Port Protection from a shoal and rocky lagoon of considerable extent.

About  $\frac{3}{4}$  mile **SE.**  $\frac{1}{4}$  **E.** from the **N.** entrance point of Port Protection is a rocky reef of considerable extent that uncovers at low water, and is marked by kelp. It is easily avoided by favoring the southern shore until well inside. The shores of the bay are steep and rocky, and usually fringed with kelp. The surrounding land consists of hills from 100 to 900 feet high.

Port Protection affords good shelter in **SE.** weather. No particular sailing directions seem necessary.

The northern headland of Port Protection is marked by several small islands lying close in shore, with a rocky ledge extending  $\frac{1}{4}$  mile **W NW.** from the opening between the two largest. This point is also the **NW.** point of Prince of Wales Island, and was named **Point Baker** by Vancouver.

**Helm Rock** is on a line between the **S.** point of Straits Island and Point Baker, and a little less than  $\frac{3}{4}$  mile distant from the latter. It is a dangerous rock, which at low-water springs has about 9 feet of water on it. There are usually heavy tide rips and whirls around it, but a careful search did not disclose any other dangers.

It is safe to round Point Baker at  $\frac{1}{4}$  mile distant, but the usual course is mid-channel between the point and Straits Island.

About  $\frac{3}{4}$  mile **NE.** by **E.**  $\frac{1}{4}$  **E.** from Point Baker, and  $\frac{1}{4}$  mile off shore, is a low rock above water, and  $\frac{1}{2}$  mile **SE.** by **E.**  $\frac{1}{4}$  **E.** from this rock is a cove about  $\frac{1}{2}$  mile deep and  $\frac{1}{3}$  mile wide at the entrance. This is a good anchorage for small vessels in 7 fathoms, muddy bottom. On the western side of the entrance are several high-water rocks.

At **Point Baker**, Sumner Strait makes a sharp turn to the **E NE.**, but a narrow branch, called **Keku Strait**, continues to the northward and westward and connects with Chatham Strait.

The general trend of the **N.** coast of Prince of Wales Island is **E NE.** for  $14\frac{1}{2}$  miles to Point Colpoys. The shore is low and rocky, but without outlying dangers. About  $6\frac{1}{2}$  miles **E NE.** from Point Baker is a shallow bight where vessels may find anchorage in 9 fathoms, muddy bottom.

**Red Bay**, 11 miles from Point Baker, is a long, narrow, and somewhat intricate inlet of the general shape of a boot, and making into the **N.** shore of Prince of Wales Island. The entrance to Red Bay, from Sumner Strait, is through a narrow and rocky channel of from  $2\frac{1}{4}$  to 4 fathoms in depth at low water, and  $\frac{1}{2}$  mile long. The narrowest part of this channel is at its southern end, and is but 75 yards in width. At this point the bay expands somewhat, with shoal banks, until past **Range Island**, which is the largest of a group of three islets that apparently close the channel. The two smaller islets are nearly covered at high water. **Range Island** is higher and wooded. South of **Range Island** is the bay proper. It is about 2 miles in length and about  $\frac{3}{4}$  mile in breadth. The soundings vary from 5 to 9 fathoms, muddy bottom. There are two small pockets of deeper water, with from 12 to 15 fathoms. The bay is entirely free from dangers.

A salmon fishery is located at the small Indian village on the bay, and the usual anchorage is 1 cable's length off shore at the village.

**Red Bay Mount**, sometimes called **False Mount Calder**, is about 3 miles **S.** by **E.** from the head of Red Bay, and is 2,843 feet high. It is usually snow capped, and presents a peculiar sharp ridge on the **N.** side. Coming from the northward **Point Colpoys** and **Red Bay Mount** are about in range.

## RED BAY.

From the vicinity of Cape Decision and the Spanish Islands, Red Bay Mount presents a sharp snow-capped peak showing between The Nipples and Mount Calder.

From Sumner Strait the entrance to Red Bay is in range with Red Bay Mount, bearing **S.  $\frac{3}{4}$  E.** This range extended to the northward cuts The Eye Opener.

**Tides.**—At Red Bay it is high water, full and change, at 0<sup>h</sup> 23<sup>m</sup>, with an extreme rise and fall of 19 feet at spring tides. The currents in the narrows leading to the bay vary from 3 to 5 knots, with a very short interval of slack water at high and low water.

Vessels may anchor at the entrance to Red Bay in the bight **W.** of Dead Island, if not wishing to enter, or if waiting for the tide.

## DIRECTIONS FOR RED BAY.

The safest time to enter is at slack high water. All dangers are marked by kelp, except possibly during the strength of the tide, which may run it under.

Enter in mid-channel between the small high-water rock at the **N.** end of Danger Island and the **S.** end of Dead Island. When the channel is open haul in to the southward, favoring the western, or Danger Island shore, until halfway through the passage, when the eastern, or Bell's Island shore should be favored to avoid the low-water rock lying close to the **SE.** point of Danger Island. Bring the easternmost of the two small and grassy islets in range with the **W.** side of Range Islet **S.  $\frac{3}{4}$  W.**, and steer that course until the large wooded islet **SW.** of Flat Island opens **S.** of Flat Island, when steer to pass midway between the two grassy rocks or islets, each of which shows about 2 feet above high water. When the eastern shore of the inner bay opens **S.** of Range Island haul into the bay and select an anchorage at pleasure.

There are two other entrances to Red Bay, one a shallow, low-water passage **W.** of Danger Island, and the other a high-water passage **E.** of Bell's Island. Both are useless except for small boats wishing to avoid the strong currents of the main entrance.

Pine Point is the eastern point of entrance to Red Bay. It is 11 $\frac{3}{4}$  miles about **E NE.** from Point Baker. About 2 $\frac{1}{2}$  miles **NE.** by **E.  $\frac{1}{4}$  E.** from Pine Point is Point Colpoys. Between these points is a moderately deep bight, well sheltered from southerly winds, where a vessel of any size can anchor in 5 to 10 fathoms, muddy bottom, about  $\frac{1}{4}$  mile off shore.

Point Colpoys is somewhat rocky, and should not be approached too closely. From Point Colpoys the shores of Prince of Wales Island trend rapidly to the **SE.**, forming the western shores of the connecting waters between Clarence and Sumner straits, already described.

The Eye Opener is the name of a dangerous rock, which covers 1 $\frac{1}{2}$  hours before high water, situated near the middle of Sumner Strait, off the entrance to Red Bay. It is also locally known as Shoo Fly Rock. The Eye Opener is 3 $\frac{3}{16}$  miles **W NW.  $\frac{3}{8}$  W.** from Point Colpoys and 11 $\frac{1}{2}$  miles **NE.  $\frac{1}{2}$  E.** from Point Baker.

McArthur Reef lies 3 $\frac{1}{10}$  miles from The Eye Opener and 3 $\frac{1}{2}$  miles **N.** by **W.  $\frac{3}{4}$  W.** from Point Colpoys. This dangerous reef has but 15 feet of water over it at low water. It is usually marked by tide rips.

Point Barrie, the **SW.** point of Kupreanof Island, lies 4 $\frac{3}{4}$  miles **NW.** from Point Baker. The vicinity of Point Barrie is very foul; **W NW.** and **E SE.  $\frac{3}{4}$  E.** from the point are groups of islets and rocks from  $\frac{1}{2}$  mile to 1 mile off shore.

The **N.** shore of Sumner Strait, from Point Barrie to Point Mitchell, a distance of 15 $\frac{1}{2}$  miles, is rugged and irregular, with outlying rocks and islets for more than a mile off shore. Nearly midway between these points is a large indentation called Totem Bay, on account of the detached pillars of rock on its western shore, which resemble the Indian totem poles. This bay is 2 miles deep and the same in width. From the **W.** entrance point a reef makes off **E.  $\frac{1}{2}$  S.** for 1 $\frac{1}{4}$  miles; there is also a shoal extending  $\frac{1}{4}$  mile off the eastern entrance point. With these exceptions the bay and entrance are clear, the low-water mark extending out for some distance on all sides of the bay.

There is good anchorage in the middle of the bay in 8 fathoms, muddy bottom.

Shingle Island marks the entrance to Totem Bay. This island is 8 $\frac{3}{4}$  miles **NE.** by **E.  $\frac{1}{2}$  E.** from Point Barrie and 1 $\frac{1}{2}$  miles off shore; it is low and wooded, and from it a reef makes to the **SE.** for nearly a mile; large portions of this reef show at low water.

Between Shingle Island and Point Barrie extends a chain of islands about 1 $\frac{1}{2}$  miles off shore.

With the chart no particular directions seem necessary for Totem Bay.

Moss Island is 2 $\frac{3}{4}$  miles **NE.  $\frac{1}{2}$  N.** from Shingle Island; it is  $\frac{3}{4}$  mile long by  $\frac{1}{2}$  mile wide, being low, and covered with trees, grass, and moss; there is a smaller island close northward of it.

These islands form the western side of Douglass Bay, in which anchorage may be found in 5 to 6 fathoms, muddy bottom; it is not, however, recommended when Totem Bay can be entered. Northwest of Moss Island is a deep bight; it is very shoal, and its entrance is blocked by rocks.

About  $\frac{1}{4}$  mile **S.** of Moss Island is a shoal having 12 feet at low water.

Point Mitchell is low, level, and rocky; a broad tapering reef extends 2 $\frac{1}{4}$  miles **E SE.** from the point; the extreme outer end of the reef bares at low water; at high water it is usually marked by tide rips, and the reef shows much kelp. The eastern face of this reef is a perpendicular wall, with 4 fathoms of water close-to.

**Level Island** lies  $2\frac{1}{2}$  miles **NE.**  $\frac{1}{2}$  **N.** from Point Mitchell; a high-water passage divides the island into two parts; **S.** of the western part is a small islet surrounded by rocks, and the entire island is surrounded by a ledge extending out nearly  $\frac{1}{2}$  mile and showing kelp. On the **N.** side of the western part are palisades of rocks 150 feet high.

Between the Point Mitchell reefs and Level Island is a passage close to the reefs, leading to an anchorage in 12 fathoms on the **NW.** side of the island.

A pinnacle rock, covered at high water, lies nearly midway between the eastern Level Island and the Kupreanof Island shore to the **NW.**; the anchorage on that side of Level Island is not recommended.

At Level Island the navigable waters of Sumner Strait are narrowed to  $1\frac{1}{4}$  miles between that island and Vichnefski Rock, widening again after bending slightly to the eastward around the **NW.** point of Zarembo Island.

**Duncan Canal** has its entrance **NW.** by **N.**  $2\frac{1}{2}$  miles from Level Island; this inlet makes to the **NW.** by **W.** from Sumner Strait into Kupreanof Island; on the **W.** side of its entrance a broad bight extends about a mile to the westward; it is filled with islands and reefs and should not be entered; a large stream flows into this bight, affording a good fishing ground for the Indians.

**White Rock** lies 1 mile **N.** by **E.**  $\frac{1}{4}$  **E.** from the **E.** end of Level Island; it stands detached, is about 15 feet high above high water, and of a very white color; nearly  $\frac{1}{4}$  mile **SE.** from it is a sunken rock marked by kelp, and on its **SW.** side are two others close-to.

About  $2\frac{3}{4}$  miles **N.**  $\frac{3}{4}$  **E.** from White Rock is the **W.** point of entrance to Wrangell Strait; this point has not been named. One and one-eighth miles **SW.**  $\frac{3}{4}$  **W.** from this point is a pinnacle rock above water, marking the **SW.** angle of a triangular-shaped shoal about  $\frac{1}{4}$  mile in extent; the least water found on this shoal was  $3\frac{1}{4}$  fathoms near the rock; the rock is  $\frac{3}{4}$  mile off shore; the passage inside it is not recommended.

#### TIDES AND CURRENTS IN SUMNER STRAIT AND CLARENCE STRAIT.

The tides are of the usual duplex character, similar to all others on the Pacific Coast. In these great highways the tidal current follows the general direction of the straits, deflecting into the many inlets and passages. In the larger connecting channels the flood usually sets in from either end, meeting at some central position, the ebb running out in both directions from this point.

The currents in Sumner and Clarence straits set directly in and out during flood and ebb, except along the shores, where it is either slack or there is a small counter current. The most noticeable of these counter currents is in Clarence Strait, at Dewey Anchorage, and among the islands at Point Onslow, where it is strong, from 2 to 3 knots, and directly opposite in direction to the current in the strait. This counter current meets the main tide at the entrance of the large bay **E.** of Point Stanhope, forming tide rips and whirls.

The flood from Sumner Strait sets in toward Zarembo Island, and there divides, a branch passing down through the Snow and Kashevarof passages until it meets the flood coming up Clarence Strait, just below the Kashevarof Islands; it is then forced gradually back through the same channels by the greater stream, and finally joins the other branch to the northward of Zarembo Island, and setting to the eastward until it at last meets and is overcome by the current from the Stikine River.

The edge of the current from the Stikine River is well defined by its muddy white appearance, and near the end of the ebb tide is sometimes noticed to the westward of Vank Island.

The flood from Clarence Strait makes up through Stikine Strait to the **NW.** end of Woronkofski Island, where it meets the flood from Sumner Strait and the currents from the Stikine River, forming numerous light rips and eddies. A branch also makes through Chichagof Pass across Zimovia Strait to the Wrangell Island shore, there turning to the northward until overcome by the Stikine current.

In Zimovia Strait the tides meet among the cluster of islands called the Village Islands, the flood setting toward this point from each end of the strait, and the ebb from this point running out in both directions.

The ebb makes out from the vicinity of Wrangell into Sumner Strait and through Stikine Strait and Chichagof Pass to Clarence Strait, augmented by the current from the Stikine River. East of Wrangell Island the ebb makes out through the Eastern Passage and Blake Channel to Ernest Sound and Clarence Strait. In the upper part of the Eastern Passage, from Point Madan, the ebb makes out around the northern end of Wrangell Island.

The current from the Stikine River flows down Zimovia Strait to the entrance to Chichagof Pass. It is also met in Stikine and Sumner straits, and the flood tide coming in backs the fresh water up as far as a line between Vank and Wrangell islands; this line of demarcation between the incoming tide and the river current is distinctly marked by the color of the water, that of the former being a light green and the latter a very light muddy color. This is sometimes noted as far **S.** as Round Point and even off the entrance to Steamer Bay. In July the Stikine River is usually at its highest; the ebb tides are of course greatly augmented by its influence, while the flood is occasionally almost nullified on the surface.

At the junction of Bradfield Canal and Blake Channel there is a meeting of tides, causing whirls.

The currents through the main channels have a velocity of from 1 to 3 knots an hour.

## DUNCAN CANAL.

The spring tides in Snow and Kashevarof passages reach a velocity of 6 knots; at neap tides from 2 to 4 knots; numerous tide rips are found among the islands in this vicinity, especially at half flood.

In Sumner Strait the tides are generally very strong; the flood makes from the S., and at Strait Island meets the tide coming down Keku Strait, producing heavy tide rips in the vicinity of Point Baker, the irregularity of the bottom aiding greatly in the surface disturbances. The spring tides run from 2 to 6 knots an hour.

## SAILING DIRECTIONS FOR SUMNER STRAIT.

From the southward, or from sea, to enter Sumner Strait it is usual to make Coronation Island and enter E. of it. Local steamers from Klawack enter to the eastward of Warren Island. The outside waters of that vicinity are but little known, and it is quite possible that rocks not yet noted on the charts may exist. From the northwestward vessels usually make the Hazy Island as a landmark and enter between Cape Decision and the Spanish Islands.

Between Coronation and Warren islands a mid-channel course enters clear. Steer N. until The Nipples are open N. of the S. entrance point of Shakan Bay; from that point a N NW.  $\frac{1}{2}$  W. course for  $4\frac{1}{2}$  miles will bring the Calder Rocks on the starboard beam, distant about 2 miles. The range of Mount Calder, bearing E SE.  $\frac{1}{2}$  S., passes over the southern rock. Here the course may be changed to N.  $\frac{1}{4}$  W., which passes midway between Strait Island and Helm Rock.

Vessels may go to the eastward of the Calder Rocks, and between Helm Rock and Point Baker, but except in coming from Shakan nothing is gained by it, and such a course is not recommended.

If bound to Shakan, from midway between Point Cora and Point Borlase, steer N. by E. to pass  $\frac{3}{4}$  mile outside the reefs lying off the S. entrance point of Shakan Bay; when the main entrance to the inlet is open N. of Station and Shakan islets haul in and steer mid-channel into and up the inlet, anchoring at discretion off Shakan Village.

Going up Sumner Strait on the N.  $\frac{1}{4}$  W. course, when Strait Island bears W., distant about  $\frac{3}{4}$  mile, a vessel will be clear of Helm Rock, and may steer E NE.; this course passes midway between The Eye Opener and Red Bay entrance. When Point Colpoys bears abeam (S SE.) a course N. by E.  $\frac{1}{4}$  E. clears McArthur Reef by a mile and leads midway between Vichnefski Rock and Level Island.

A vessel might pass to the northward of The Eye Opener and McArthur Reef, but the soundings on such a course show the possibility of danger, and it should not be attempted without necessity; but little distance is gained by it.

If bound through Wrangell Strait, continue N. by E.  $\frac{1}{4}$  E. beyond Level Island, and enter the strait on either side of Channel Rock. If bound to Wrangell, when White Rock bears W. by N.  $\frac{1}{4}$  N., steer E. by S.  $\frac{1}{4}$  S., passing either side of Vank Island.

If entering Sumner Strait between Cape Decision and the Spanish Islands, steer for Bluff Island, NE.  $\frac{3}{4}$  N., for about  $8\frac{1}{2}$  miles, when Point St. Albans will bear W. by N., distant about 3 miles, when the course may be changed to N., and proceed as before.

Coming from the northward, when between Vichnefski Rock and Level Island, steer for Red Bay Mountain until Point Colpoys can be made out distinctly, a mile distant, when McArthur Reef will have been passed.

In navigating these waters steer a range when possible, as the tidal currents are strong, and often prevent making a good compass course.

## DUNCAN CANAL

is an inlet about 20 miles long, and from  $\frac{3}{4}$  to  $1\frac{1}{2}$  miles wide, extending in a general NW. by W. direction into Kupreanof Island. The character of the country about Duncan Canal is mountainous on the eastern shore, rising boldly from the water's edge, and densely wooded, the peaks usually showing more or less snow until the end of summer. On the western shore the mountains are not so high, and the rise from the shore line is much more gradual. A low, marshy valley between the Portage Mountains, near the head of the inlet, and the Bohemian Range, on the N. side of the island, extends from the head of the canal to Portage Bay, and is used by the Indians as a portage. A few Indian families inhabit the western side of the canal. Canada geese breed at the head of the canal, and during the early fall the mud flats are covered with thousands of them.

The soundings in the canal show the bottom to be somewhat irregular, and usually less than 20 fathoms, and free from obstructions.

**Directions.**—To make the entrance to Duncan Canal, pass 1 mile to northward of White Rock, steering W NW., until Lung Island, low and wooded, is on the port beam, when steer for the middle of the narrow entrance, and by keeping a mid-channel course no dangers will be encountered up to the mud flat at the head of the canal. No special sailing directions are given.

**Beecher Pass** is about 4 miles within the entrance of Duncan Canal and connects it with Wrangell Strait. This pass and its entrance is filled with islets and reefs, showing much kelp. A too close approach to Grief Islet must be avoided, as foul ground exists to the southward and eastward and inshore of this small island.

On the western side of the canal, opposite Beecher Pass, a long peninsula makes out in a general easterly direction, a near approach to which should be avoided, as two reefs make out a short distance to the eastward, rendering the entrance to the long shallow bay south of the peninsula rather foul ground.

With good local knowledge, small vessels might, at high water, use Beecher pass.

## WRANGELL STRAIT.

This is a narrow, somewhat tortuous, navigable channel connecting Sumner Strait with Frederick Sound. Its southern entrance is about 19 miles *W.* from Wrangell, and it is the passage now generally used by vessels plying between the south and Sitka.\*

Its general direction is true *N.* and *S.*, and it lies between Mitkof Island on the *E.* and Woewodski Island and Lindenberg Peninsula on the *W.* It is 20 miles in length, while the width from shore to shore varies from  $\frac{1}{4}$  to  $\frac{3}{4}$  of a mile. The channel is, however, contracted at various points to a width much less than the distance between the shores, and there are numerous rocks and shoals, which render its navigation difficult, and even impossible, at low water, for vessels drawing more than 10 feet. It is, however, well buoyed, and marked by beacons, and is visited each season by the Inspector of the 13th Light House District, to examine and renew the aids to navigation.

The shores, as a rule, are low near the water, with high land immediately back, varying in height from 1,400 feet to 3,200 feet. There are several anchorages in the strait.

About 5 miles within the southern entrance to the strait is Beecher Pass, connecting it with Duncan Canal, and separating Woewodski Island from Lindenberg Peninsula of Kupreanof Island.

**Tides.**—It is high water, full and change, at Finger Point, in Wrangell Strait, at 13<sup>h</sup> 05<sup>m</sup>, with an average rise and fall of 14 $\frac{1}{2}$  feet. The greatest rise and fall at spring tide is 23 $\frac{1}{2}$  feet, and at neap tides 7 feet. The tides generally stand at high and low water about 20 minutes, and run each way 6 hours. The tides meet near Finger Point.

The entrance to the strait lies between Point Alexander, the *S.* point of Mitkof Island, on the *E.*, and an unnamed point of Woewodski Island, lying about 1 mile *W. SW.* of it; a shoal makes out *SW.* by *W.* from Point Alexander nearly a  $\frac{1}{4}$  mile, and having but 15 feet at its outer edge at low water.

Midway Rock lies about a mile within the entrance; it is sometimes awash at extreme high water, but it is usually uncovered, and has deep water close to on either side.

Deception Point, on the western shore, is  $\frac{3}{4}$  mile above Midway Rock; on the western side of this point is a good-sized cove, but which is foul and does not afford anchorage.

December Point, on the east shore one mile above Midway Rock, appears as an island close in shore; from this point a ledge extends *SE.* about 1 cable.

Point Lockwood is on the western shore  $\frac{1}{4}$  mile above Deception Point; it has a narrow outlying ledge, and  $\frac{3}{4}$  mile further, on the same side, is another outlying ledge, the outer end of which is marked by a white wooden beacon; opposite this beacon, on the eastern shore, is the mouth of a small creek, from which a shoal makes out more than  $\frac{1}{2}$  mile.

Anchorage may be had anywhere in mid-channel between December Point and the Point Lockwood beacon.

The Battery Islands, about 1 mile above Point Lockwood, are three in number, with rocks between and surrounding them; they are low; the northern one is the largest and has several trees growing on it; the other two only grass and bushes. The channel to the westward of the islands is the one generally used, though the narrow eastern channel is quite safe for moderate-sized vessels. The rocks surrounding the Battery Islands are covered with kelp; on the western shore opposite the *N.* Battery island, a ledge, showing kelp, makes out about 150 yards.

In mid-channel, on the line between Point Lockwood beacon and the southern Battery island, is a sunken rock not marked by kelp, over which there is 17 feet at low water. Another rock lies to the westward of the beacon, but is too close in shore to constitute a serious danger to navigation.†

Hicks Point is on the eastern shore  $\frac{1}{4}$  mile above the Battery Islands; off the point extends a ledge about 100 yards, visible at low water and showing kelp. From this point the channel is clear until nearly abreast the *S.* end of Keene Island, where is a dangerous sunken rock in mid-channel, called Spike Rock, having about 1 foot over it at low water, and showing above water at extreme low tide; it is marked by heavy kelp, which is, however, usually run under during the strength of the tide. A second-class nun buoy, with red and black horizontal stripes, has been placed about 100 feet *SE.* by *S.* from Spike Rock; it may be passed on either hand, but is generally left to the eastward; the eastern channel has most water, but is not quite as direct as the western.

Between Keene Island and No Thoroughfare Point the water is very shoal and foul.

Keene Island, large and heavily wooded, lies at the eastern end of Beecher Pass; foul ground extends south and northwest from it.

\* In June, 1890, the Pacific coast steamship *Queen*, having a length of 341 feet and drawing 20 feet when loaded, under command of Captain James Carroll, passed through Wrangell Strait without difficulty.

† C. S.—Notice to Mariners, No. 122, November, 1889.



On the eastern shore of the strait, abreast Keene Island, is East Ledge, showing at low water, and marked at its outer end by a white wooden beacon.

**Burnt Island** is half a mile above Spike Rock; it is a small wooded knoll, with a reef or ledge a short distance above it, and another extending to the S SE., the southern end of which is marked by a white wooden beacon. There is no passage to the westward of Burnt Island.

**Burnt Island Reef**, on the E. shore, a short distance above Burnt Island, makes out about 175 yards, and is always covered, and shows but little kelp; the outer end of this reef is marked by a third-class nun buoy, No. 2, painted red.

At this point the channel is very narrow.

From Burnt Island Reef to the northward the eastern shore is foul and shoal to nearly mid-channel. Nearly  $\frac{3}{4}$  mile above the Burnt Island Reef buoy is a shoal having 15 feet over it at low water, with a few feet deeper water on each side of it.

**South Ledge**, extending from the eastern shore nearly to mid-channel, lies about one mile above the Burnt Island Reef buoy; it partially uncovers at half tide, and is not marked by kelp. South Ledge is marked by a third-class nun buoy, No. 4, painted red, and placed on the E. side of the channel at the end of the ledge.

About  $\frac{1}{4}$  mile above the South Ledge buoy is a black third-class can buoy, No. 1, which is placed on the W. side of the channel, and marks the end of the ledge that makes out from North Point.

On the E. side of the channel,  $\frac{1}{4}$  mile above the North Point Ledge buoy, is a red second-class nun buoy, No. 6, marking the extremity of the North Ledge, which makes out from Spruce Point, and covers at  $\frac{1}{2}$  flood.

**Spruce Point** is a low, narrow, wooded peninsula, extending to the SW. from the eastern shore; it is about 2 miles above Keene Island; NW. by W.  $\frac{1}{2}$  W. from Spruce Point is Bush Top Islet, which at high water shows as three small islets, the largest one covered with bushes, the others being grassy knolls; a white wooden beacon is placed on the SE. grassy knoll. There is a narrow boat passage to the westward of Bush Top Island.

Above this point the strait widens out to nearly a mile, but the navigable channel is less than  $\frac{1}{2}$  mile wide. In mid-channel  $\frac{1}{4}$  mile NE. from the beacon on Bush Top Islet is a shoal with 16 feet at low water, with several feet more water on each side. North of Spruce Point the channel turns more to the eastward, passing close to Anchor Point, on which is placed a white wooden beacon. On the W. side of the channel W SW. from Anchor Point is a rocky ledge that covers at half tide and is marked by kelp.

**Blind Point** lies nearly  $\frac{3}{4}$  mile N.  $\frac{1}{2}$  E. from Anchor Point. Between these points is a deep cove, dry at low water, near the middle of which is a small, round, wooded islet called Blind Island. It was supposed that a boat passage existed from this cove to the eastward to Summer Strait, but the survey developed the fact that Blind River, which empties into the cove, is navigable for canoes only for a few hundred yards.

Nearly  $\frac{1}{4}$  mile above Blind Point is a white beacon; a line joining this beacon with the one at Anchor Point marks the E. side of the channel, which is here about 400 yards wide.

**Boulder Flat**, an extensive shoal, mostly bare at low water, extends from Bush Top Island to Point Vexation, with shoal water extending out nearly  $\frac{3}{4}$  mile farther; the flats and shoal water show considerable kelp at high water.

In mid-channel SW. from the Blind Passage Point beacon is a small shoal with 16 feet and deeper water on each side. North of this shoal and close to it is a black third-class can buoy, No. 3. This buoy is not placed to mark the shoal but to mark a turn in the channel to the westward.

**Vexation Point** is the eastern point of a small high-water island, called Woody Island, and lies  $\frac{1}{2}$  mile W. from Blind Point beacon; NE. of Vexation Point, distant about 125 yards, is **Vexation Point Rock**, a low, black, round-topped rock, marked by a white wooden beacon. There is a reef between it and the point. About 50 yards NE. from Vexation Point Rock is a small, but very dangerous sunken reef, called **Danger Rock**. It is nearly awash at extreme low water. A black second-class can buoy, No. 5, is moored about 30 feet NW. of the rock, marking it, and at the same time the W. side of the channel, which is here very narrow. The E. side of the channel is marked by a red spar buoy, No. 8, of the second class. This buoy at the same time marks the end of an extensive boulder ledge, making out to the S. from Danger Point, on the eastern shore. The channel between these buoys is about 100 yards wide.

On the N. side of Woody Island is quite a deep cove,  $\frac{3}{4}$  mile wide, and dry at low water. The N. point of this cove is a somewhat blunt, projecting wooded point, called False Island Point. On its N. side is a narrow, projecting, wooded point, called Island Point. It is a leading mark in passing Danger Rock. The two points are separated by a shallow cove, dry at low water.

**Green Rocks**, two low, round-topped islets, lie  $\frac{3}{4}$  mile above Vexation Point beacon, the northern one grassy, and the southern one nearly barren. The southern Green Rock is always above water, although at the highest tides it is only about 6 feet square out of water. The northern Green Rock is covered at high water. Each rock is marked by a white wooden beacon. The channel is to the eastward of them.



North of the Green Rocks, and on the **W.** side of the channel, is a dangerous rocky reef making out from Rock Point. It is mostly bare at low water. Close to the **NW.** end of this reef is a first-class red spar buoy, No. 10.

On the Mitkof Island shore,  $\frac{1}{4}$  mile above Rock Point, is the Astronomical Station of the survey of the strait. It was determined to be in—

Latitude .....	56° 40' 33".3.
Longitude .....	132° 55' 33".7.

Variation 29° 51' **E.** in 1886.

**Finger Point**, on the western side of the strait,  $\frac{1}{2}$  mile above Rock Point, is a low, wooded point, with a sand beach projecting to the northward;  $\frac{1}{4}$  mile above Finger Point extensive mud flats begin, drying at low water from both shores, and having a narrow dividing channel about  $\frac{3}{4}$  mile long. The tides meet near Finger Point, and here a good anchorage is found in 8 to 10 fathoms, muddy bottom. There are some tide whirls here, but they have no great force.

At the Flats the strait is about  $\frac{3}{4}$  mile wide, and the narrow channel through is marked by two red buoys; the southern one, called Finger Point buoy, is **NW.**  $\frac{1}{2}$  **N.**,  $\frac{1}{8}$  mile from the point. It is a second-class red spar buoy, No. 12, marking the eastern side of the channel, and is about 100 feet from the **SW.** end of the North Flat. The buoy at the **NW.** end of the channel is also a second-class red spar buoy, No. 14, marking the eastern side of the channel. It is called Wrangell North Flat buoy, and is  $\frac{1}{8}$  mile **NW.** from Finger Point and near the **NW.** point of the North Flat. On the western shore, nearly abreast buoy No. 14, is a large boulder.

**Green Point** lies on the western shore, about  $1\frac{1}{2}$  miles above Finger Point. It is a small high-water island, having on it a clump of bright green trees, and is very easily distinguished by its different color from the surrounding timber. Shoal water extends some distance out to the northward and eastward of Green Point, and the **W.** side of the channel is here marked by a black third-class can buoy, No. 7.

From here the channel widens to nearly the whole width of the strait, and the water deepens to from 15 to 20 fathoms;  $1\frac{1}{2}$  miles above Green Point, on the eastern shore, a good anchorage may be found in 10 to 12 fathoms.

**Mountain Point**, steep and wooded, is nearly  $2\frac{1}{2}$  miles above Green Point, on the western shore. Here the strait turns slightly to the westward, and at  $2\frac{3}{4}$  miles from Mountain Point again becomes quite narrow and much shoaler. The **E.** shore here forms a considerable bight where good anchorage may be found in 6 fathoms.

At Blunt Point, where the channel narrows, are boulder patches on each side of the channel; they are well marked by heavy kelp.

From Blunt Point the channel continues straight and narrow for 1 mile, when the strait again widens, and the channel becomes somewhat intricate and obstructed by shoals and a bar reaching entirely across the channel. On the **W.** side is a rather extensive lagoon, nearly dry at low water. On the opposite shore is Turn Point, to the westward of which shoal water extends nearly to mid-channel, and **NW.** of which is the bar extending across. From the western shore, **N.** of the lagoon, shoal water extends nearly to mid-channel.

The bar at Turn Point is marked by two black spar buoys, Nos. 9 and 11, marking the western side of the bar passage. From the bar the channel to Frederick Sound is straight but narrow, and with shoal banks on either side.

Ledge Point, on the western shore, is 1 mile **N.**  $\frac{1}{2}$  **W.** from Turn Point. From it a ledge makes out 400 yards **S.**  $\frac{1}{2}$  **E.** Its extremity is marked by a white wooden beacon.

**Prolewy Rock**, covered at high water, is on the **W.** side of the channel at the **N.** entrance of the strait. The **W.** side of the entrance, to the northward of Prolewy Rock, is somewhat shoal and foul, and shows scattering kelp.

About  $\frac{1}{4}$  mile **E.** of the northern entrance to the strait a good anchorage may be found in about 7 to 9 fathoms, about 2 cables off shore.

#### SAILING DIRECTIONS FOR WRANGELL STRAIT.\*

The buoys in Wrangell Strait are placed for vessels going **N.**

In entering the strait Point Alexander should be given a clearance of  $\frac{1}{4}$  to  $\frac{1}{2}$  mile, as a shoal makes out to the **W SW.** nearly  $\frac{1}{4}$  mile, having but 15 feet on its outer edge at low water; then steer for Point Deception, passing usually to the westward of Midway Rock. Here the tide runs from 1 to 4 knots an hour.

When abreast Midway Rock take a mid-channel course and keep it until near Point Lockwood beacon, when the western shore should be somewhat favored to avoid the shoal on the eastern shore. The Battery Islets may be passed on either side, though the western channel is preferable, being wider and of greater depth. Passing to the westward, the western shore should be somewhat favored to avoid the rock with 17 feet water over it, determined in 1889 to be **NW.**  $\frac{3}{4}$  **N.** of the Point Lock-

\* From the notes of Lieutenant Commander Snow, U. S. Navy, who conducted the survey in 1886.

wood beacon, hauling into mid-channel when up with the southern Battery Islet. Passing to the eastward keep close to the main shore, as reefs make out from the southern and middle parts of the islets a short distance.

After passing Battery Islets keep in mid-channel until No Thoroughfare Point is abeam, when vessels may take the channel on either side of Spike Rock. Should the buoy be gone, the range of Point Lockwood and December Point just touching carries clear W. of the rock, and a vessel will be abreast it when a small round island in Beecher Pass is in range with the larger island nearest to the westward of it. A vessel should then haul up to the northward to recover the main channel. Here the tide runs from 3 to 5 knots an hour.

To pass to the eastward of the rock, keep the eastern shore close aboard until the small, round island is on the range given before, when haul out into mid-channel to avoid the Keene Island Ledge, marked by a beacon. From thence continue in mid-channel to pass to the eastward of Burnt Islet and the ledge extending from its southern end, slightly favoring the Burnt Islet side. Round the Burnt Island reef red buoy close-to, to the westward, standing diagonally across the channel, heading for North Point until up with the South Ledge buoy, which pass close-to, thence passing westward of the buoys as they are laid down, until to the northward of Spruce Point, whence steer to pass close to Anchor Point. In this reach the tides run from 4 to 6 knots. Should the buoys be gone, the kelp will mark the danger, unless the tide should be running sufficiently strong to run it under.

Passing from 100 to 150 yards from Anchor Point, steer for the black buoy, No. 3, which marks the turn at Blind Point. A line joining the beacons on Anchor and Blind points marks the eastern edge of the channel. In this reach the navigable channel is scant  $\frac{1}{4}$  mile wide and the tide runs from 1 to 2 $\frac{1}{2}$  knots.

When up with the black buoy, round it close-to, passing to the eastward of it. When Island Point is seen between the red buoy off Danger Point and the black buoy off Vexation Point, steer that range, passing between the buoys. A line joining Island Point and the extreme of Blind Point passes clear to the eastward of Vexation Rock.

When nearly up to Island Point haul out to pass to the eastward of the Green Rocks, passing from 75 to 100 feet from their eastern low-water line, and keep the course parallel to their trend to avoid the ledge off Rock Point, which is marked by red buoy, No. 10. When past this buoy steer mid-channel until abreast of Finger Point, and then steer for the red spar buoy, No. 12, at the S. end of the mud-flat channel. Pass about 15 yards to the westward of this buoy, and steer for the center of Green Point; the middle of the Green Rocks should then be right astern. The mud-flat channel is 125 yards wide. Keep the red spar buoy, No. 14, open to the eastward of Green Point. Pass it 25 yards to the westward, and steer to leave the black buoy, No. 7, off Green Point, to the westward close-to, from whence take a mid-channel course past Mountain Point to Blunt Point.

In passing Blunt Point favor the western shore. Then take a mid-channel course until the strait begins to widen, when follow the eastern shore until the entrance to the strait appears well open, then steer for the black buoy, No. 9, which pass close-to to the eastward, and then for black buoy, No. 11, called the middle ground buoy, which also pass to the eastward close-to. From this buoy haul sharp out, heading NE. well into the bight on the opposite shore until the white beacon is on the port beam, when the vessel should be in about mid-channel, and a mid-channel course about NNE. leads clear out of the strait.

In the vicinity of Blunt Point the tides run from 2 to 4 knots, and at the entrance of the strait from 3 to 5 knots an hour.

**Going South.**—If Prolewy Rock, at the entrance of the strait, is covered (it covers at three-quarters flood), and the tide is running in, vessels drawing 17 feet can safely take a fair mid-channel course as far as the black buoy off Green Point and through the mud-flat channel to the anchorage off Finger Point, beyond which it would not be safe to go with a falling tide.

In passing through Wrangell Strait it is always safest to enter by either end during the first quarter of the flood. There are no local pilots for Wrangell Strait. Pilots for the entire inland passage can usually be found at Victoria, B. C., and at Port Townsend.

Navigators are particularly cautioned not to place too much dependence on the positions of the various buoys, as the strong currents, ice, and driftwood are liable to move them out of position or carry them away. The beacons are also liable to be carried away by ice and strong currents. The inspector of the Thirteenth Light House District usually makes an inspection here in July or August of every year.

**Dry Strait**, bare at low water, crosses the flats between Sumner Strait and the head of Frederick Sound. As defined by recent surveys, Dry Strait lies between Mitkof Island on the W. and Sergieff, Farm, and Dry islands on the E., and extends from the southern edge of the Stikine Flats northwesterly about 8 miles to a point about 2 miles SE. from Cosmos Point on Mitkof Island, where it joins Frederick Sound. At high water spring tides 6 feet can be carried through Dry Strait by keeping to the westward of Wilson Islands and following close around Mitkof Island, but the strait is practically useless except for small boats.

## FREDERICK SOUND

is bounded to the westward by the shores of Admiralty Island between Points Gardner and Gambier, a distance of 34 miles; to the northward and eastward by the shores of the Continent from Point Windham to the mouth of the N. arm of the Stikine River, a distance of 70 miles; to the southward and eastward and southward and westward by the shores of Kuiu, Kupreanof, and Mitkof islands for about 75 miles.

The eastern arm of Frederick Sound, extending from Dry Strait to Cape Fanshaw, is about 47 miles long and from 3 to 8 miles wide.

The deposit from the Stikine River is probably causing a gradual extension of the flats, both in Sumner Strait and Frederick Sound.

Le Conte Bay, on the NE. side of the head of Frederick Sound, is inaccessible for vessels on account of the great quantity of floating ice always to be found there, the ice continually breaking off in huge masses from the Le Conte Glacier at the head of the bay. The foot of this glacier extends to the water's edge, and on the rise of the tide is lifted up, and with the falling tide immense masses weighing thousands of tons break off with a thundering noise that can be heard miles away. To the Indians the bay is known as Thunder Bay.

The entrance to Le Conte Bay from Frederick Sound, extending in an E. and W. direction, is narrow and extends between the N. end of the flats and the mainland, and has a well-defined bar, about 1 mile long, with  $2\frac{1}{2}$  fathoms least water on it, after passing which a depth of 30 fathoms is found, deepening to 75 fathoms in the middle of the bay, and deep water to the foot of the glacier.

Large icebergs are frequently found grounded on the bar. The floating ice follows closely the northern shore of Frederick Sound; it is seldom seen as far out as the middle of the sound, and on the ebb tide is carried along the shores, passing between McDonald Islands and Horn Cliffs, banking up in Brown Cove, and on the flats to the southward of Point Agassiz. The flood tide carries the ice back into Le Conte Bay, where it forms immense packs impassible for boats. Occasionally a few stray pieces work into Wrangell Strait as far as Green Point. Le Conte Bay is much frequented by seal.

Horn Cliffs, being among the most prominent landmarks in Frederick Sound, are on the N. shore, NE.  $\frac{1}{2}$  E. from the entrance to Wrangell Strait; they form the face of a remarkable bold head, about 1,800 feet high, falling straight to the water, and with a sugar-loaf peak, or pinnacle, 3,000 feet high, towering above and immediately behind the brink of the cliffs.

McDonald Islands, two in number, are small, wooded islets, lying 1 mile to the SW. from Horn Cliffs, with deep water between.

Soukhoi Islands consist of two large, low, wooded islands, with one small one lying between them; they are  $3\frac{3}{4}$  miles N NW.  $\frac{1}{2}$  W. from the entrance to Wrangell Strait and 1 mile off the Kupreanof shore.

Frederick Sound, from the flats at Dry Strait to Stephens Passage, is free from all dangers, and has a depth of 80 to 234 fathoms. The steamer route, after entering the sound from Wrangell Strait, is to the westward of Soukhoi Islands, and following the western shore up to the Cape of the Strait, from which a W. course clears Cape Fanshaw 1 mile to the southward, running parallel to the mainland from Bay Point to Cape Fanshaw.

Brown Cove,  $2\frac{1}{2}$  miles N NW. from the McDonald Islands, is an indifferent anchorage. The cove affords no protection in bad weather, as the wind draws either up or down the sound, and on the ebb tide it is often filled with ice from Le Conte Bay. The anchorage is in 12 fathoms; the head of the cove is dry at low water and consists of mud flats, which are gradually increasing from the débris deposited by several glacial streams that empty into the cove.

From Wrangell Strait two prominent knolls to the W. of the entrance to Brown Cove have the appearance of being two islands; the larger of the two, marking the W. point of the cove, has a peculiar light-yellow bald spot upon it which can be seen nearly across the sound and forms a landmark in making the entrance.

Point Agassiz lies  $5\frac{1}{2}$  miles W NW.  $\frac{1}{4}$  N. from Horn Cliffs; it is low and wooded, and for  $2\frac{1}{2}$  mile on each side are shallow bights that are bare at low water; the ice from Le Conte Bay often grounds on these banks.

Wood Point forms the E. entrance point to a large bay called Thomas Bay, and lies NW. by W.  $\frac{1}{4}$  W.,  $4\frac{3}{4}$  miles from Point Agassiz. The western point of Thomas Bay is Point Vandeput; both points are low and wooded; they lie  $2\frac{1}{2}$  miles apart W. by N.  $\frac{1}{2}$  N. and E. by S.  $\frac{1}{2}$  S.

Point Vandeput is a low, narrow point, about 2 miles long in a S SE.  $\frac{1}{4}$  E. direction; at its outer end are large boulders and a few small trees. Between Point Vandeput and Point Wood extends a reef, in a somewhat circular form, dry at low water, except in the middle, where there is a channel about 1 mile wide with a bar extending across it from  $\frac{1}{2}$  to  $\frac{3}{4}$  mile wide. This bar has from 4 to 9 fathoms water, shoaling suddenly from 18 fathoms outside and dropping suddenly inside to 25 and 30 fathoms. On the outer edge of the bar, about the middle of the channel, is a shoal spot showing 15 feet.

Thomas Bay, from the bar to Baird Glacier, at its head, is somewhat circular in form and about 10 miles in length. On its southeastern side is a broad bight encompassing a large island and extend-

## THOMAS BAY—DIRECTIONS.

ing about 3 miles eastward to the moraine of the Patterson Glacier. The bay cannot be considered as a harbor of refuge in thick or bad weather on account of the difficulty and danger of passing the entrance, and when once in the bay a suitable anchorage is difficult to find on account of the great depth of water.

**Spurt Point**, in Thomas Bay, lies  $3\frac{1}{2}$  miles **NE.** by **E.** from Point Vandeput. This point is steep and wooded; **SW.** from it, about  $\frac{1}{2}$  mile, is a somewhat extensive reef, a portion of which shows at all times. At Spurt Point the bay turns from **NE.** to **N.** by **W.**

**Ruth Island** is the large island in the **SE.** arm of the bay; close to its **NW.** end is a small islet and some low-water rocks. Rocks and shoals close the passage on the **S.** side of Ruth Island. On the **NE.** side of this **SE.** arm is a small islet, called Spray Island; the best anchorage in Thomas Bay is in 17 fathoms, close in shore, between Spray Island and the large waterfall on the mainland. **Bock Bight**, lying  $1\frac{1}{2}$  miles **NE.** by **E.**  $\frac{1}{4}$  **E.** from Wood Point, is a narrow deep bight, the entrance to which is bare nearly 2 hours before low water, forming a perfect dam with deep water inside; toward the latter part of the ebb tide the water rushes out over this dam with great force.

**Scenery Cove**, in the northern part of Thomas Bay, does not afford anchorage except for very small vessels.

On the **NE.** side of Thomas Bay, on the almost perpendicular mountains of the Admiral Range, are several landslides, which are very noticeable from a long distance in clear weather.

The scenery in Thomas Bay was considered by the surveying party of 1887 to be the most varied and grand that they had seen in Alaska. In this bay will be found the imposing Baird Glacier, immense bluffs rising 2,000 or 3,000 feet, like huge walls, from the water's edge 100 fathoms deep, beautiful waterfalls, numerous trout and salmon streams, snow-capped peaks above the most charming verdure, huge landslides, many little islets and coves, and at the head of the **SE.** arm is the moraine of the Patterson Glacier. On all sides are huge mountain peaks rising from 3,000 to 6,000 feet, and always snow-capped.

The **Baird Glacier** consists of three branches (as there are two medial moraines), the principal one coming down from between Agassiz and Hull peaks, meeting the other two which pass between Perry and Stewart peaks. The larger branch seems to be 8 or 10 miles in length, and where it debouches on the moraine its front appears to cover more than half the ice line. This glacier is slowly retreating. The medial moraine between the eastern and western branches is very marked.

The Patterson Glacier is undoubtedly still advancing, as will be readily seen by the destruction of trees from the gradual encroachment of the face of the glacier. The stream formed by the melting ice flows through the moraine and empties into Thomas Bay.

From the vicinity of the Soukhoi Islands the great moraine of the Patterson Glacier, of which Wood Point forms the western extreme, has the appearance of being a great island, of which the prominent point of Brown Cove forms the eastern end. It is low and covered with trees.

## DIRECTIONS FOR THOMAS BAY.

To enter Thomas Bay an excellent range will be found by keeping Spurt Point in line with the upper or northernmost landslide under the Admiral Range. This range will clear the shoal spot on the bar to the northward, passing midway between it and the reef making out from Point Vandeput. Once inside the bar there are no dangers, except in the broad bight between Spurt Point and Point Vandeput; these are avoided by not going to the northward of the entering range which is **NE.**  $\frac{1}{4}$  **N.** The anchorage in Thomas Bay is in the southeastern arm, between Spray Island and the large waterfall on the mainland, in about 17 fathoms, close in shore.

In clear weather a very prominent landmark in this vicinity is The Devil's Thumb, a remarkable pinnacle or shaft, rising perpendicularly over 1,600 feet above the top of a mountain which is itself over 7,000 feet in height. From the northern entrance to Wrangell Strait this remarkable peak bears **N.** by **E.**  $\frac{1}{4}$  **E.**, distant 28 miles.

From Point Vandeput **W.**  $\frac{1}{2}$  **N.**  $7\frac{1}{2}$  miles is Grand Point. The shores curve to the northward between these points, making a broad bight about  $1\frac{1}{2}$  miles deep. The old charts designate an anchorage **W.** of Point Vandeput, in this bight, but the soundings of the present survey do not show any anchoring water, and there is no protection from any direction except **NE.**

**Bay Point** lies 4 miles **W.** by **S.**  $\frac{1}{2}$  **S.** from Grand Point. Both these points are moderately high and steep, heavily wooded, and rising rapidly to the high land to the northward.

The entrance to **Farragut Bay** lies between these points.

The numerous reefs and rocks and the deep water in this bay render it of no particular use as an anchoring place.

There are 2 large arms to Farragut Bay; the western or smaller one is, however, practically useless on account of a rock in the middle of the entrance, which uncovers only at low water of spring tides; there is also a bar across the entrance, the western portion of which is very shoal. From 6 to 8 fathoms can be carried over the bar between the sunken rock and the eastern entrance point; this is the only possible passage, and is less than  $\frac{1}{4}$  mile in width. There is no desirable anchorage in this arm. About  $\frac{1}{2}$  mile **SE.** of the **E.** entrance point to this arm there is a large rock showing several

feet above high water with a rock awash at half tide about 100 yards off, and a shoal running in a **SSE.** direction about  $\frac{1}{2}$  mile, and terminating in a sunken rock.

**Read Island**, about  $1\frac{3}{4}$  miles long and  $\frac{1}{2}$  mile wide, lies on the eastern side of Farragut Bay. There is a very narrow passage between this island and Grand Point, and **N.** of the island a passage  $\frac{1}{2}$  mile wide leads to the eastern arm of the bay. In the middle of this northern passage is a small rocky islet called **Flock Rock**, with a rock about 100 yards **WSW.** from it.

The narrow entrance **S.** of Read Island is somewhat objectionable on account of a pinnacle rock awash at low water lying  $\frac{1}{2}$  mile **SW.** from the end of the reef which extends out from the southern point of the island, with deep water between it and the end of the reef. This entrance is narrow but not difficult nor dangerous if the vessel is kept well over in the direction of Grand Point, on a **NNW.** course, till the end of the reef is in line with Bay Point, then stand for mid-channel of the narrow passage which is quite free from obstructions. From 4 to 6 fathoms can be carried over the bar in this passage with from 20 to 30 fathoms on each side of it.

The only anchorage in Farragut Bay is in 13 fathoms at the **N.** end of the eastern arm, which is expanded into a broad bay and is called **Francis Anchorage**. It is off a bight in the end of the headland that forms the eastern point of entrance to the inner bay; the northern half of this bay is a sand and boulder flat dry at low water. The best passage to this anchorage is to the northward of Read Island, keeping clear of the outlying rocky ledges marked by kelp that make out about  $\frac{1}{4}$  mile from the western shore of the island, passing midway between the **N.** end of the island and Flock Rock, and thence in mid-channel. A short reef makes out from the **W.** point of Francis Anchorage, but it can be approached to within  $\frac{1}{4}$  mile with perfect safety.

Mud flats and low marshy grass lands are found at the heads of both arms of Farragut Bay, and several small glaciers will be seen on the faces of the peaks to the westward, the streams from which flow in upon the flats.

The ledges extending off Bay Point and Grand Point are all marked by kelp.

From Bay Point to Point Highland, a distance of  $5\frac{1}{2}$  miles, the shore line trends nearly **W.**, and is steep and bluff with kelp-marked ledges a short distance off shore.

From Point Highland to Cape Fanshaw, a distance of 4 miles, the coast keeps the same direction but is much lower. Cape Fanshaw is a long low point, and wooded, terminating in a moderately long sand spit with a large boulder at the extreme end and deep water close-to.

At Cape Fanshaw the shore turns sharply to the **NE.**, forming a deep bight on its **N.** side, in which are some islands and rocks.

The Southern Shore of Frederick Sound, from Cosmos Point to Frederick Point, a distance of 10 miles, trends **WNW.**  $\frac{1}{2}$  **W.** It is somewhat irregular and moderately low and wooded, with high land a mile or more back from the shore.

**Ideal Cove**, on the **W.** side of Cosmos Point, affords an excellent anchorage for small vessels in 7 fathoms. The entrance is narrow but clear of obstructions, the only danger being two well-defined rocks awash close to Cosmos Point, and a vessel on entering should stand in close to the small detached island at the **W.** side of the entrance. Two small lakes lie back of the head of the cove.

About  $3\frac{1}{2}$  miles above Cosmos Point a large stream comes in, off which a flat, dry at low water, extends out about  $\frac{3}{4}$  mile. There is a small island on the **W.** side of this flat, close in shore. **NW.**  $\frac{1}{2}$  **N.** off this island anchorage may be found in 14 fathoms about  $\frac{1}{2}$  mile off shore.

At Frederick Point the coast turns to the **W.** by **S.**  $\frac{1}{2}$  **S.** for 3 miles, thence bending to the **NW.**, the shores being low and wooded, rising gradually to the higher land of the Survey Mountains.

About  $4\frac{1}{4}$  miles **W.**  $\frac{1}{4}$  **S.** from Frederick Point is the northern entrance to Wrangell Strait;  $\frac{1}{2}$  mile **E.** of this entrance, and about  $\frac{1}{4}$  mile off shore, is a good anchorage in 7 to 9 fathoms, muddy bottom, but dropping off quite suddenly into deep water. This anchorage is of great use if waiting for the tide in Wrangell Strait, or if, when coming out of the strait, a fog is met in Frederick Sound. The northern entrance to Wrangell Strait cannot well be mistaken, the land on the **W.** side being nearly 3,000 feet high, while on the **E.** side the entrance point is low. On the **W.** side, just inside Prolewy Point, is a small, low, wooded island; a shoal with from 9 to 12 feet extends **NNE.** from the island and **SSE.** from Prolewy Point. It shows scattering kelp.

When entering from the northward Prolewy Rock, when visible, should be brought to bear **SW.** before hauling in for the entrance.

The ebb tide at the **N.** entrance to Wrangell Strait runs from 3 to 5 knots to the northward.

From Prolewy Point the coast of Kupreanof Island trends **NW.** for about  $6\frac{1}{4}$  miles, when a slight bend to the westward is made for  $4\frac{1}{2}$  miles to the Cape of the Strait, the land being high and the shores bold except a small valley in the bight about 3 miles below the cape. From this cape the coast, by a broad curve, trends to the **WSW.** for about  $7\frac{1}{2}$  miles to the entrance to Portage Bay, with steep, bold shores rising rapidly to nearly 4,000 feet at the highest point.

**Portage Islets** are the landmarks for the entrance to Portage Bay. They lie  $8\frac{1}{4}$  miles from Cape of the Strait, and about  $\frac{1}{2}$  mile **W.** of the entrance to the bay. They consist of two small and rather low, wooded islets connected at low water by a rocky platform, their total extent being about 500 feet **E.** and **W.** and 200 feet wide, and lying about  $\frac{3}{4}$  mile off shore, with a narrow passage close to the islands between; 13 fathoms may be carried through this passage.

## PORTAGE BAY—DIRECTIONS.

**Portage Bay.**—The entrance to this bay is very narrow, not exceeding  $\frac{1}{4}$  mile E. and W., and which is further diminished to a channel of about 100 yards between the 3-fathom curves by shoal water making out from either shore. The E. and W. points of entrance are low, narrow, and pointed, and have steep sand beaches, and are about  $\frac{1}{4}$  mile apart. Opposite East Point, and within the bay, the western shore recedes to form a large cove which is quite dry at low water;  $\frac{1}{2}$  mile farther S. and E. another cove with a narrow entrance and dry at low water indents the same shore.

The northeastern shore within East Point is straight and compact, and the navigable portion of the bay extends parallel with it about 3 miles with an average width of 2 cables, the shores shoaling everywhere very gradually and without dangers beyond the 3-fathom line.

The bay extends about 3 miles further to the SE., the last 2 miles being comprised in Goose Cove, dry at low water and nearly a mile wide, with Stop Island, Harrington Rock, and another small rock in its northwestern part. Harrington Rock is about 3 feet high above high water.

## DIRECTIONS FOR PORTAGE BAY.

When the two small Portage Islets are in line bearing W. by S.  $\frac{1}{2}$  S., distant  $\frac{3}{4}$  mile, stand in on a S. by E.  $\frac{1}{2}$  E. course with Flat Point directly ahead, and a solitary Indian hut near Flat Point slightly on the port bow; this course will clear the shoal off Boulder Point, marked by kelp, and the shoal spit to the NNW. of West Point.

Anchorage may be obtained anywhere in the bay in about 5 to 6 fathoms for the distance of  $2\frac{1}{2}$  miles from the entrance; the bottom is sandy but gives fair holding ground and is thoroughly protected. Strong winds sometimes sweep through the narrow valley between the head of the bay and Duncan Canal.

During spring tides the flood brings many strong swirls as far in as Hook Point, causing a vessel to swing over her anchors; the best anchorage is, therefore, about 2 miles inside East Point, with the entrance to Dry Cove shut in.

This bay is well adapted for steamers and is an excellent anchorage notwithstanding its narrow entrance. In extreme cold weather ice forms in the bay.

From Portage Bay the N. shore of Kupreanof Island trends nearly W. by S. for about 22 miles to Cape Bendel, where it turns to the southward and eastward, forming the eastern shore of the broad northern entrance to Keku Strait. About 10 miles W. of Portage Bay is a small stream evidently draining a salt-water lagoon, flooded at high water or possibly only at spring tide; this locality is frequented during the season by immense schools of herring, drawn there to feed on the purple terapods coming out of this stream.

## TIDES AND CURRENTS IN FREDERICK SOUND.

The flood tide enters Frederick Sound from Chatham Strait and runs to the southward and eastward in the sound and to the northward toward and through Stephens Passage, with a weak tidal current in the open sound. In the former it meets the flood from Sumner Strait at Dry Strait near Point Blaquiére, the ebb flowing from the junction of the flood in Dry Strait through Frederick Sound to Chatham Strait.

The flood enters Wrangell Strait at each end, meeting about halfway through at Finger Point.

The time of high water, also the rise and fall of the tides, is practically the same over this entire body of water, the extreme difference between Wrangell and Cape Fanshaw being but 7 minutes, the time at Wrangell being the earlier; the time of high water in Wangell Strait being 3 or 4 minutes later than in Frederick Sound.

Current observations made between Farragut Bay and Cape Fanshaw showed the set to be diagonally across the sound instead of in the direction of its axis, and to the eastward of Portage Bay, showing but slight and variable force of current.

The velocity of the tidal current at the entrance to Portage Bay is from 5 to 6 knots at spring tides but it is soon dissipated in the great volume of the sound. The full force of the ebb current passing over the W. entrance point causes swirls and overfalls from 1 to 2 feet in height, and dangerous to small boats.

The current at the N. entrance of Wrangell Strait is very strong, attaining a velocity of 4 or 5 knots, making deep swirls in the vicinity of Prolewy Rock.

The rise of the flood tide sweeps over the flats at Dry Strait with great force and velocity.

The flood enters Duncan Canal and runs in the direction of its axis, except at the W. entrance of Beecher Pass, through which it passes into Wrangell Strait, causing a cross current in this immediate vicinity. The ebb flows in an opposite direction, and the same cross current, with a westerly set, is found at Beecher Pass.

The enormous amount of mud and debris in suspension from the glacial waters meeting with the tidal currents from the sea, causes a gradual but constant deposit, forming bars and shoals, as is particularly noticeable on the flats at the delta of the Stikine River, the bars at the entrance of Thomas Bay, Le Conte Bay, and in Wrangell Strait, at Turn Point, and the mud flats.

The existence of an inshore northerly current along the shores of southeastern Alaska has long been known. The following observations made during the summer of 1889, show that it also affects the inland passages. A spar buoy was observed\* adrift off Mountain Point, in Wrangell Strait, on the 29th of May. On July 22, the same buoy was noted by the same observer 6 miles **SE.** by **S.** from Morris Reef, in Chatham Strait, and on August 23, the same buoy was again seen by the same observer,  $\frac{1}{2}$  mile off the **E.** end of Lemesurier Island, in Icy Strait.

## FREDERICK SOUND.

**Western Arm.**—The western entrance to Frederick Sound, between Point Kingsmill, on Kiui Island, and Point Gardner, on Admiralty Island, is nearly 10 miles wide, these points bearing from each other **NW.** by **W.**  $\frac{1}{4}$  **W.** and **SE.** by **E.**  $\frac{1}{4}$  **E.** Its general direction is **NNE.** for about 22 miles to Turnabout Island, where an arm turns to the eastward toward Dry Strait, and is already described, while the main body of water, which is here about 15 miles wide, **NE.** and **SW.**, continues to the northward as far as Point Windham, about 24 miles above Cape Fanshaw. At Point Windham the width is reduced to less than 5 miles, and the connecting passage to the northwestward has been called Stephens Passage.

The **W.** side of Frederick Sound is formed by the **SE.** shore of Admiralty Island, from Point Gardner to Point Hugh. In the broad part of the sound **NW.** from Cape Fanshaw are numerous islands and rocks, and entering the shore of Admiralty Island are many bays and inlets.

**Yasha Island**, low, partially wooded, and some outlying ledges lying close-to, is nearly 6 miles **ESE.** from Point Gardner, marking the entrance to Frederick Sound from Chatham Strait. The island may be passed on either side; the ledges surrounding it are marked by kelp.

**Point Kingsmill** is the **SE.** entrance point to Frederick Sound from Chatham Strait. It is high, steep, and wooded. A ledge, bare at low water, extends about 100 yards off the point.

**Point Cornwallis** bears from Point Kingsmill **N.** by **E.**, distant about  $6\frac{1}{4}$  miles. This point is long, low, and narrow, and wooded. It forms the **SW.** point of the northern entrance to Keku Strait, previously mentioned as connecting with Sumner Strait.

Between Point Kingsmill and Point Cornwallis are two bays. Of these, Security Bay lies directly to the northward of Point Kingsmill, and Saginaw Bay directly to the southward of Point Cornwallis, the two being separated by a low, wooded peninsula.

**Security Bay.**—Point Paralysis is the southern entrance point of Security Bay. It is 1 mile **N.** by **E.**  $\frac{3}{4}$  **E.** from Point Kingsmill. Just **S.** of it is a small indentation, unsurveyed, called Band Cove, the **SW.** point of which is called Hourigan Point,  $\frac{1}{8}$  mile southward of which is an Indian village.

**Round Island** is the northern entrance point of Security Bay. It lies 1 mile **N.** by **E.**  $\frac{1}{4}$  **E.** from Paralysis Point. Midway between these two is Roadstead Island, from which a chain of three small islands, called in their order, eastward, Flat Island, Cedar Island, and Harbor Island, extends 1 mile in an **E.** by **S.**  $\frac{3}{4}$  **S.** direction. The entrance to the bay is to the southward of these islands. There is a channel on their northern side, but it is not well known, and in the eastern part are some rocks.

From Round Island the northern shore trends about **ESE.**  $\frac{3}{4}$  **S.** for  $1\frac{1}{4}$  miles to Retaliation Point, with several shallow bights between.

**Retaliation Point** is bluff, steep-to, and wooded; **ENE.** of it is Cedar Bight, the eastern part of which is shoal, with some rocks in it, and a little more than 300 yards **SE.**  $\frac{1}{2}$  **S.** from the point is a large kelp patch, with one or two rocks showing at extreme low water. Another rock, awash at one-quarter flood, lies **E.** by **S.**  $\frac{1}{4}$  mile from Harbor Island, nearly midway between it and Retaliation Point.

A few hundred yards to the **NE.** of Retaliation Point is a gravel beach, where a small stream comes in. A small Indian village has here been rebuilt on the site of one destroyed by Commander Meade in the U. S. S. *Saginaw*, in 1869, in retaliation of two atrocious murders committed by the tribe of Indians living there. It is called Tom's Rancho.

The eastern side of Cedar Bight is formed by two large islands. The western point of the southernmost island is the Expedition Point of Meade. From these islands the northern shore trends generally **SE.** for  $1\frac{1}{2}$  miles to the head of the bay, where a large stream comes in through a somewhat extensive valley.

The southern shore of the bay from Paralysis Point has a general direction of **SE.** by **E.**  $\frac{1}{2}$  **E.** for  $2\frac{1}{4}$  miles to Point Lookout, and thence it is about 2 miles to the head of the bay.

**Bibb Shoal**, usually showing kelp, upon which  $4\frac{1}{2}$  fathoms is noted, lies **NNW.**  $\frac{1}{4}$  mile from Paralysis Point. A more complete survey may show a less depth of water on this shoal.

Within the bay, about  $\frac{1}{2}$  mile eastward from Paralysis Point, and extending  $\frac{1}{4}$  mile off shore, is a compact group of 6 or 8 small islets, the largest of which is bluff to the northward and to the **SE.**, about 200 yards in extent, and is called Christmas Island. The smaller one next **NW.** from it is called Cork Islet.

The chain of islands in the middle of the harbor lie  $\frac{1}{4}$  mile **N.** of Christmas Island, and the entrance channel to the bay is between them.

\* By Captain H. H. Lloyd, pilot for the Pacific Coast Steamship Company.



## SECURITY BAY.

In the bay,  $\frac{5}{8}$  mile **NW.**  $\frac{1}{2}$  **W.** from Point Lookout, and nearly  $\frac{1}{4}$  mile off the southern shore, is **Indian Rock**, and 350 yards **W.** of it is another smaller rock. Both are nearly awash at extreme high water.

**S SE.**  $\frac{3}{4}$  mile from Retaliation Point is the western end of **Cleft Island**, with a deep notch in it. The island is about  $\frac{3}{8}$  mile long, **E.** and **W.**; at its eastern end are some bare rocks. Another islet, very narrow, about  $\frac{1}{4}$  mile long, lies close to Cleft Island on its northern side, with a high-water passage between.

Near the middle of the **S.** side of Cleft Island is a shallow bight, off which, 350 yards to the **S SW.**, is **Stewart Rock**, covered 3 feet at low water, and usually showing kelp at slack water.

About  $\frac{1}{4}$  mile eastward of Point Lookout are some outlying bare rocks. To the eastward of a line between these rocks and the eastern end of the **Expedition Point Island**, the bay is shoal, and has several reefs, some of which cover at high water.

Two anchorages are noted in Security Bay, one **SW.** of Retaliation Point, and the other **E SE.** of Cleft Island. The bay affords perfect shelter and good holding ground. A reconnaissance survey of this bay was made in 1881 by the officers of the U. S. S. *Wachusett*, Commander Henry Glass, U. S. Navy, commanding, and from that the greater part of this description has been taken. The reconnaissance is published as Coast Survey Chart No. 723.

The tides in this vicinity rise about 14 feet.

## DIRECTIONS FOR SECURITY BAY.

The course in is **E.** by **S.**  $\frac{1}{2}$  **S.** midway between Christmas and Cedar Islands, with the **SW.** point of Cleft Island ahead.

When Harbor Island bears **N.**, a **SE.** by **E.**  $\frac{1}{4}$  **E.** course passes clear between Stewart Rock and Indian Rock. When Indian Rock and the rock to the westward of it are in range, Stewart Rock will have been passed, and an **E.**  $\frac{1}{4}$  **N.** course leads to the anchorage in 7 to 9 fathoms, midway between the rocks off Point Lookout and Expedition Point Island, with Tom's Rancho just open **E.** of Cleft Island. This is considered the best anchorage in the bay.

The other anchorage is in 11 to 16 fathoms on the line between Harbor Island and the **W.** end of Cleft Island, with Retaliation Point bearing **NE.**

The land **S.** of Security Bay, forming the backbone of Point Kingsmill, is composed of high mountains. To the eastward is also high land. The northern shores are moderately low; the entire country is densely wooded. From the vicinity of Tom's Rancho a trail leads to Saginaw Bay.

From Point Kingsmill, **NW.**  $\frac{1}{4}$  **W.**, about  $6\frac{1}{2}$  miles, is Yasha Island. It is said that this island stands on a ridge, bar, submarine spit, or moraine, which extends clear across the entrance to Frederick Sound with 12 fathoms of water on it.

**Meade Point** is the **SW.** extreme of the low wooded peninsula separating Security Bay from Saginaw Bay. It is 3 miles **N.**  $\frac{1}{4}$  **E.** from Point Kingsmill. The peninsula is about 2 miles in breadth, and the **S.** entrance point of Saginaw Bay is  $1\frac{1}{2}$  miles **NE.**  $\frac{3}{4}$  **N.** from Meade Point.

**Saginaw Bay** has not yet been surveyed. It was entered and named in 1869 by Commander R. W. Meade, U. S. Navy, in the U. S. S. *Saginaw*, who destroyed an Indian village on its **N.** shore. The bay is about  $5\frac{1}{2}$  miles long **E.** and **W.**, and nearly 2 miles wide, the northern shore being somewhat irregularly indented. Along the **S.** shore appear to be some islets and rocks, and some islands at the head of the bay.

**Point Cornwallis**, low and wooded, is the **N.** entrance point of Saginaw Bay. It lies  $3\frac{1}{4}$  miles **N.** by **E.**  $\frac{1}{2}$  **E.** from Meade Point. Off the point rocks appear to extend out a considerable distance. No detailed chart of this bay exists; on the general charts the bay is represented as much obstructed by rocks; it is known, however, that such is not the case.

In a bight on the **N.** shore, about 2 miles inside Point Cornwallis, is an Indian village. It is reported that a safe anchorage, in from 7 to 11 fathoms, exists about abreast this village, and it is stated that, though open to the **SW.**, the anchorage is well sheltered, easily found, and is accessible to all vessels.

The only directions given are to keep the **N.** shore aboard, at about  $\frac{1}{4}$  mile distance, until past the bold bluff point on the **W.** side of the bight, thence steer for the village and anchor when a depth of 8 fathoms is reached. This anchorage has been called **Halleck Harbor**.

About 10 miles **NE.** by **N.**  $\frac{1}{4}$  **N.** from Point Cornwallis is Point Macartney, the northern extreme of the **N.** entrance to Keku Strait. It is described by Vancouver as a "large, rounding, though not lofty promontory, in which are several open bays, and near the point some rocks."

About 2 miles **SE.** of Point Macartney is a point projecting to the southward called Point White; **E.** of this is a large bay and some Indian villages, and also some outlying small islets and rocks. On the **S.** side of this entrance to Keku Strait is a large, rather compact group of islands called Keku Islets. The main body of the entrance appears to be clear water, though not so shown on the general charts.

**Keku Strait**, as previously noted, is a passage from Sumner Strait to Frederick Sound. It has not been surveyed. Its southern part is narrow and much obstructed; at its narrowest and shoalest



part it is said that only 8 feet can be carried at low water, and the mean rise of tide is about 12 feet; the tidal current is quite strong at some points.

At about 11 miles within the northern entrance, on the southern shore, is an inlet called **Port Camden**, extending about 12 miles to the southward; it is said to contain one or more anchorages. In this vicinity, at near high-water mark, are numerous coal croppings. From the head of Port Camden a short portage exists to an arm of the Bay of Pillars, entering Kiui Island from Chatham Strait.

On the northern shore, about 5 miles **E SE.** from Point White, is another inlet called **Hamilton Bay**, extending about 5 miles to the **E NE.**, and about a mile wide. Just within the northern entrance to the bay a cove or arm extends to the **NW.** about 2 miles; at its entrance are some islets. A large Indian village on this bay was destroyed by Commander Meade in 1869.\*

It is reported that at the head of Port Camden, where a good anchorage is said to exist, that the rise and fall of the tide is 30 feet, but this statement requires confirmation.

Several light-draught vessels have passed through Keku Strait; it should not, however, be attempted without local knowledge, and with vessels of light draught. A regular survey may develop a good channel.

From Point Macartney the shore of Kupreanof Island trends nearly **N.** for about 5 miles to Cape Bendel, off which nearly a mile is a ledge of bare rocks, called the Pinta Rocks; they are nearly awash at high water.

Cape Bendel is moderately high and wooded; here the shore of Kupreanof Island rounds off to the eastward with somewhat irregular shores for about 22 miles to Portage Bay, already described. In a shallow bight to the eastward of Cape Bendel are some rocks that cover at high water, and are marked by kelp.

About 3 miles **N.** by **W.** from Cape Bendel is Turnabout Island, with some rocky islets lying close-to on its **SW.** side. This island is wooded and rather high, flattened on top, with a dome-shaped peak near the middle, as seen from the northeastward.

There is a good deep passage between this island and Pinta Reef of  $1\frac{1}{2}$  miles in width.

From Turnabout Island Cape Fanshaw bears **NE.  $\frac{1}{2}$  E.**, distant 14 miles.

The western shore of Frederick Sound is here formed by the southeastern end of Admiralty Island, of which Point Gardner is the extreme southern point. This point is the extreme of a long, narrow peninsula extending nearly 2 miles from the broader portion of the island; it is low and wooded, rising gradually to a height of about 1,000 feet, and extending as a ridge to the northward into Admiralty Island. Indications of coal of excellent quality have been discovered in this ridge.

Nearly  $\frac{1}{2}$  mile, about **SE.** by **S.**, from Point Gardner is a large bare rock a few feet above high water, between which and the point is foul ground; some rocks and a kelp patch extend a short distance to the southward from the rock. In this vicinity the joining of the tides off Point Gardner often causes strong tide rips and swirls.

Surprise Harbor, on the **NE.** side of Point Gardner, is a bight, open to the southward, about 4 miles wide at the entrance and nearly 2 miles deep; it affords a good anchorage except in southerly weather. A good-sized islet and many rocks occupy the northeastern third of this bight; there are also some rocks along the shore on the western side. The anchorage is in from 8 to 15 fathoms, about the middle of the harbor, between the islet and Point Gardner.

A long, narrow point, called Bartlett Point, resembling at a distance a narrow chain of wooded islets, forms the eastern side of Surprise Harbor and separates it from Murder Cove. From the rock off Point Gardner the extremity of Bartlett Point bears **NE.**, distant 4 miles.

A patch of kelp about 200 feet long, in a **NE.** and **SW.** direction, lies off the **E.** side of the entrance to Surprise Harbor; it bears **NE.** by **E.  $\frac{3}{4}$  E.** from the rock off Point Gardner, distant 3 miles, and from Bartlett Point **S.  $\frac{1}{2}$  W.**, distant  $1\frac{1}{2}$  miles, and is nearly 4 miles **NW.** from Yasha Island.

Murder Cove is an inlet on the **E.** side of Bartlett Point, extending about 3 miles to the **NNW.** into Admiralty Island, with an average width of about  $\frac{1}{2}$  mile. About two-thirds the distance within the entrance the inlet contracts to about a cable in width, and immediately expands again to about its original width. A good-sized stream enters the head of this inner basin, off which is a mud flat, and the shallow bights along its sides are also bare at low water. The western side of the outer harbor is a narrow fringe of ledges lying close along Bartlett Point and having deep water close-to. On the eastern side the entrance point is a compact cluster of rocky islets and ledges extending well out to the **SW.** from the broad wooded point called Carroll Point. The entrance, about  $\frac{1}{2}$  mile wide, is clear of all dangers. Murder Cove affords a snug anchorage for vessels of moderate size in the outer harbor in mid-channel in from 15 to 17 fathoms, muddy bottom, or in the inner basin in from 7 to 11 fathoms. During southeasterly gales the effects of the sea might be felt in the outer harbor, but it is doubtful if the wind would blow home. Yasha Island lies 4 miles **S SE.** from the entrance to Murder Cove.

Neither Surprise Harbor nor Murder Cove have yet been surveyed, and the delineation of this vicinity on the present charts is very erroneous.

\* It is proper to note here that the native inhabitants of this vicinity have a very bad reputation and are not to be trusted in the absence of a force sufficient to control them.

Yasha Island\* is the natural turning point from the northward into Frederick Sound. It may be passed on either side. It lies about 6 miles **E SE.** from Point Gardner, and from it Turnabout Island bears **NE.** by **N.**  $\frac{1}{4}$  **N.**

From Carroll Point the shore of Admiralty Island to the northward is but little known, the survey now in progress not yet being extended **S.** of Point Napean. During the survey **N.** of that point, the topography of the present chart was found to be so much in error that it was hardly possible to clearly identify Woewodski Harbor.

According to the present charts Point Townshend lies about 9 miles nearly **NNE.** from Carroll Point, and about 6 miles **SSW.**  $\frac{3}{4}$  **W.** from Point Napean. Between Point Carroll and Point Townshend appears a broad open bight with irregular shores, near the bottom of which are shown two rocks. Between Point Napean and Point Townshend appear three indentations. In the southern one is shown an island; the middle indentation is called Herring Bay, and was used by the Russian trading vessels. The navigation of this section of coast is, in the absence of a survey, not recommended except with the aid of local knowledge, which would be difficult to obtain.

Point Napean determined by the late survey to be in†

Latitude .....	57° 08' 20" N.
Longitude .....	134° 16' 15" W.

is described as a high, steep, bluff, rocky point off which a ledge of rocks marked by kelp extends  $\frac{1}{2}$  mile. It is the southern entrance point to Eliza and Woewodski Harbors; from it Turnabout Island bears **E NE.**  $\frac{1}{8}$  **N.**, distant  $9\frac{3}{4}$  miles, and Cape Fanshaw bears **NE.**  $\frac{3}{4}$  **E.**, distant  $23\frac{1}{2}$  miles. There are several groups of islands in the broad expanded northern arm of Frederick Sound. The survey of 1889 also developed near the usual track of vessels the position of a previously unknown rock covered by 21 feet at low water. These will be described in their order. The waters of the sound are deep, varying from 100 to 200 fathoms. The shores of the islands are usually bold-to; care should be taken in approaching within  $\frac{1}{2}$  mile of the shores of Admiralty Island or the mainland; sunken dangers are usually marked by kelp.

Deepwater Point, lying **N.** by **E.**  $\frac{1}{2}$  **E.**,  $2\frac{3}{4}$  miles from Point Napean, is the northern entrance point to Woewodski Harbor; rocky ledges marked by kelp extend about  $\frac{1}{8}$  mile off the point, with two or more rocky heads visible at high water. Nearly midway between these two points is the southeastern end of Liesnoi Island, of irregular shape and extending about  $1\frac{1}{4}$  miles in a **NW.** direction, and about  $\frac{3}{4}$  mile in average width. Off a deep bight on the **NE.** side of this island is Woewodski Harbor. On each side of the island are narrow and somewhat intricate passages called, respectively, North and South Passage, leading to Eliza Harbor, an inlet extending about 11 miles in a **NNW.**  $\frac{1}{2}$  **W.** direction, and about  $\frac{1}{2}$  mile in average width. In this vicinity are many dangerous sunken rocks and ledges, and the tides run through the narrow passages leading to Eliza Harbor with great force, rendering the navigation intricate, and it should not be attempted, particularly the South Passage, without some local knowledge.

The **SE.** point of Liesnoi Island is called File Point; off it  $\frac{1}{2}$  mile extends a rocky ledge, and **SE.**  $\frac{1}{4}$  **S.** nearly  $\frac{1}{4}$  mile from it is a reef awash at low water and marked by kelp. A little more than  $\frac{1}{4}$  mile **SW.** from File Point is Pin Point, off which is a projecting ledge about 100 yards in length, and also a small rocky islet at about the same distance. **W.** by **S.**  $\frac{1}{8}$  of a mile from Pin Point is Thumb Point, the **SW.** point of Liesnoi Island; projecting ledges and sunken rocks marked by kelp extend about 160 yards off shore between these points.

From Point Napean **NNW.**  $\frac{1}{4}$  **W.**  $\frac{1}{2}$  mile is Sharp Point, and **NW.**  $\frac{1}{4}$  **N.** from that point across a deep bight filled with sunken rocks and ledges is Saw Point; off the former a ledge extends  $\frac{1}{8}$  mile, marked at its outer end by kelp, and off Saw Point a ledge extends 130 yards, and 60 yards outside of that is a rock just awash at low water and surrounded by shoal water for 50 yards.

South Passage, which is reduced by these shoals to a width of 70 yards, lies between Saw Point and the **SW.** shore of Liesnoi Island. In northerly winds an indifferent anchorage may be had in about 7 fathoms between Pin Point and Saw Point, on the following bearings: Pin Point **SW.**  $\frac{1}{2}$  **W.**, and Point Napean and Sharp Point in range. From this anchorage Turnabout Island bears **E NE.**  $\frac{1}{2}$  **E.** South Passage is nearly closed by the rocks off Saw Point, has a sharp turn with strong tidal eddies, and should not be attempted. The sunken rocks are marked by kelp, but it does not show when the tide is running.

Woewodski Harbor, on the **NE.** side of Liesnoi Island, is a double-headed harbor of small extent, near the middle of which is a group of 3 low, bare, rocky islets called the Polivnoi Rocks, surrounded by kelp-marked rocky ledges. On Liesnoi Island, **SW.**  $\frac{1}{4}$  **S.** from Deepwater Point, is Jaw Point, and **NW.** nearly  $\frac{3}{4}$  mile across a deep bight in the island is Log Point. This bight is shoal and rocky, and from each point are ledges projecting out about 100 yards. Between Jaw Point and

\* Described on page 139.

† This correct position of Point Napean is **SW.**  $\frac{3}{4}$  **S.**  $8\frac{1}{4}$  miles from the position given on the old charts. The position of Point Gardner as given on the latest Coast Survey charts is latitude 57° 00' 30" N., longitude 134° 31' 45" W. The above description between these points was taken from the old charts and is liable to be much changed when that section of the coast is accurately surveyed.

Polivnoi Rocks are numerous ledges and kelp-marked sunken rocks, between which are passages leading to the contracted and indifferent anchorage of Woewodski Harbor.

**To enter Woewodski Harbor**—From a point midway between Jaw Point and Deepwater Point, with Log Point bearing **W.**, a **W.  $\frac{1}{2}$  S.** course leads in between the kelp patches; continue this course and anchor in 4 fathoms on the range between the middle Polivnoi Rock and a small rocky islet lying close to shore on the **S.** side of the bight of Liesnoi Island.

**The North Passage to Eliza Harbor** enters from the **NW.** angle of Woewodski Harbor; this passage is straight but narrow; its northern shore is bold and deep close-to; its southern shore is foul, and sunken rocks and kelp patches extend to mid-channel, leaving a navigable passage about 100 yards in width. The waters of Eliza Harbor are deep with usually bold shores. The only available anchorage is at the **S.** end of the harbor, off the **W.** end of Liesnoi Island. The rocks in the **S.** side of the North Passage cause a tidal whirl; the ebb runs out with a velocity of 4 knots, and the flood sets in at about 3 knots.

**Tides.**—It is high water, full and change, in Eliza and Woewodski Harbors at about 0<sup>h</sup> 22<sup>m</sup>, with a mean rise and fall of about 14 feet, and an extreme rise and fall of 22 feet.

#### DIRECTIONS FOR ELIZA HARBOR.

Keep 1 mile off shore until Liesnoi Island is well open, then stand in between Jaw Point and Deepwater Point, passing the latter at  $\frac{1}{4}$  mile distance, heading **N NW.  $\frac{1}{2}$  W.**, with Bluff Point directly ahead until North Passage is well open **N.** of Polivnoi Rocks, then haul gradually to the westward, passing midway between the rocks and the **N.** shore; keep the **N.** shore of the passage close aboard. There is not less than 6 fathoms in the passage, which was carefully examined; round Club Point to the southward, and anchor in mid-channel in 18 to 20 fathoms, hard bottom, at two-thirds the distance toward Thumb Point.

With the close proximity of other and far better anchorages, the use of these harbors will be very seldom necessary. The chart is a good guide; without it they should not be attempted without local knowledge. The north passage should only be attempted at slack water.

**Point Pybus** lies **N.** by **E.  $\frac{1}{2}$  E.** 13 $\frac{1}{2}$  miles from Point Napean. It is the northern point of entrance to a large bay called **Pybus Bay**, the entrance to which, about 5 miles broad, is filled with islands, shoals, and sunken rocks; the point is bluff, rounded, and wooded. A ledge extends a little more than  $\frac{1}{2}$  mile off it, which at high water shows as one or more small rocky islets. **Pybus Bay** is open to the **SE.** The water is deep, and it affords no advantages as an anchorage.

**Yelowy Island** is the southern and outermost of the islands at the entrance to **Pybus Bay**; this island is about  $\frac{1}{2}$  mile long, narrow and wooded. It is about 2 miles off shore, and from it Point Napean bears **SSE.  $\frac{1}{4}$  S.**, distant 7 $\frac{1}{2}$  miles.

**False Point Pybus** lies 5 $\frac{1}{2}$  miles **E.** by **N.  $\frac{1}{2}$  N.** from Point Pybus; it is the southern entrance point to an extensive bay called **Gambier Bay**; between these two points the shore line is somewhat irregular with no outlying dangers, except a rocky ledge lying **NE.** by **N.** a little more than a mile from Point Pybus and about  $\frac{1}{2}$  mile off shore. **False Point Pybus** is a high, bluff, wooded point facing to the **ENE.** and having bold water close-to.

**ENE.  $\frac{1}{2}$  E.** 4 $\frac{1}{2}$  miles from **False Point Pybus** is **Sail Island**; this island is  $\frac{3}{4}$  mile long, and is narrow with two small islets close to its southern end; it is wooded and is about 300 feet high. About 1 $\frac{1}{8}$  miles **N.** by **W.** from the **NW.** end of **Sail Island** is a sounding of 6 $\frac{1}{2}$  fathoms, with 45 and 50 fathoms between it and the island.

**SE.  $3\frac{1}{2}$  miles** from **False Point Pybus** lie **The Brothers**, a group of 14 islands and rocks, the largest being about 2 miles long by 1 mile broad, 600 feet high and wooded. **SSW.  $\frac{1}{2}$  W.** 3 miles from the largest Brother is **Round Rock**, small, bare, and 40 feet high. From **Round Rock** **Yelowy Island** bears **SSW.  $\frac{1}{2}$  W.**, distant 5 $\frac{1}{2}$  miles.

About 2 $\frac{1}{4}$  miles **SE.** by **E.** from **Sail Island**, and in range with **Cape Fanshaw** from that island, is a group of islets and ledges called **The Five Fingers**. This group occupies a space of 3 miles in length **NW.** and **SE.**, and 1 $\frac{1}{2}$  miles in breadth. These islets are low and sparsely wooded; they are bold-to, and there are deep passages among them, and also a deep passage between them and **Sail Island**. The southeastern islet of the group lies **NW.** by **W.** 5 $\frac{1}{2}$  miles from **Cape Fanshaw**.

**Gambier Point**, the northern entrance point to **Gambier Bay**, lies **N.** by **W.  $\frac{1}{4}$  W.** from **False Point Pybus**; it is the southeastern end of a narrow, wooded, high-water island with a ledge extending  $\frac{1}{2}$  mile off it. **NW.** by **N.** 1 $\frac{3}{4}$  miles from **Point Gambier**, and  $\frac{3}{8}$  mile off shore, is a dangerous rock which covers at  $\frac{1}{4}$  flood.

**Gambier Bay** is of very irregular shape, and is divided into two parts by a chain of narrow islands and reefs. The outer portion, extending from **Point Gambier** about 7 miles in a **NW.** by **W.** direction, is about 2 miles wide at the entrance, and narrows to  $\frac{1}{4}$  mile at the head. In this portion the water is deep, and it affords no anchorage. In the outer harbor a chain of islets and reefs extend to the **NW.** by **W.** about  $\frac{1}{4}$  mile off the southern shore.

**Church Point**, lying **W.** by **S.  $2\frac{1}{2}$  miles** from **Gambier Point**, is the southeastern point of entrance to the extensive inner harbor; this entrance, which is about 1 $\frac{3}{8}$  miles wide, is nearly filled by two

long narrow islands connected by reefs, and by ledges extending out from the **NW.** entrance point. The southeastern of these islands is called **Gain Island**, and is separated from Church Point by  $\frac{3}{8}$  mile, this distance being reduced to a little more than  $\frac{1}{8}$  mile by ledges off Gain Island and two bare rocky islets lying off Church Point; in mid-channel of this latter distance is a sunken rock covered 3 fathoms at low water.

There are several islands within the inner bay. The water is usually deep, and the only desirable anchorage is in **Snug Cove** on the **S.** side of the bay, **SW.** of Church Point.

A chain of narrow islands, of which Gambier Island is the southeastern, lie close along the **N.** shore of the outer harbor.

**Price Island** is the southeastern of the chain lying along the **S.** shore of the outer harbor. Extensive ledges extend  $\frac{5}{8}$  mile to the **SE.** of the island, and show at high water as two bare rocky heads. About  $\frac{3}{4}$  mile **NW.** by **W.** of Price Island is Chapel Island, of small extent. Ledges, showing rocky heads at high water, lie between these islands. On the range of the **NW.** point of Chapel Island and Church Point, and  $\frac{3}{8}$  mile **NE.**  $\frac{1}{4}$  **E.** from the former, is a sunken rock showing kelp, and between Chapel Island and the **NW.** point of the inner harbor entrance are ledges of more or less extent, all marked by kelp.

**Snug Cove**, about  $1\frac{1}{2}$  miles deep by  $\frac{5}{8}$  mile wide, lies **S SW.** from Gain Island. Extensive flats, dry at low water, extend  $\frac{1}{2}$  mile from the head of the cove, with deep water close-to. Between Snug Cove and Church Point is a narrow indentation nearly  $1\frac{1}{2}$  miles deep, which is almost entirely dry at low water. The usual entrance to the inner harbor, and to the anchorage at Snug Cove, is between Church Point and Gain Island, and this may be reached from the outer harbor by passing up the narrow but clear passage between Price and Chapel islands and Church Point. This, however, necessitates a somewhat sharp turn around Church Point, and the better route is up the broader passage of the outer harbor, entering between Point Gambier and Price Island.

#### DIRECTIONS FOR GAMBIER BAY AND SNUG COVE.

Enter the outer harbor at 1 mile distance **S.** of Point Gambier, and steer **NW.** by **W.**  $\frac{1}{2}$  **W.**, which carries about  $\frac{3}{8}$  mile off the shores of Gambier and Romp islands. When Church Point is well open **NW.** of Chapel Island, the sunken rock, marked by kelp, lying  $\frac{3}{8}$  mile **NE.**  $\frac{1}{4}$  **E.** from the island, will have been passed, and when Church Point bears **SW.** by **S.**, a **SW.** course will carry clear in mid-channel through the narrow passage into the inner harbor. This course passes directly over the 3-fathom rock in the passage. Continue this course until Muse Island, in the inner harbor, opens **W.** of the small rocky islet lying close **SE.** of it, when a **S.**  $\frac{1}{4}$  **W.** course will carry clear to the anchorage in the middle of Snug Cove, in about 17 fathoms, with Gem Point bearing **E.**

In the passage between Church Point and Gain Island the tide runs about 3 knots, but the navigation is not difficult.

**Tides.**—It is high water, full and change, at Snug Cove at about 0<sup>h</sup> 20<sup>m</sup>, with a mean rise and fall of 14 feet.

#### SEYMOUR CANAL.

Point Gambier is the southern point of entrance to an inlet called Seymour Canal, which extends in a **NW.** by **W.** direction into Admiralty Island for 35 miles, with an average width of about 2 miles. The upper part of the canal to a distance of 20 miles from its head is filled with islands, ledges, and rocks.

Point Hugh, the northern entrance point of Seymour Canal, lies 8 miles **N NE.** from Point Gambier. It is the southern extreme of a long, narrow, and moderately high peninsula separating Seymour Canal from Stephens Passage. From Cape Fanshaw, Point Hugh bears **NW.**  $\frac{3}{4}$  **W.**, distant  $24\frac{1}{2}$  miles.

**E.** by **S.** 2 miles from Point Hugh the survey of 1889 developed a small shoal having  $8\frac{1}{2}$  fathoms least water, with 53 and 73 fathoms close-to.

In Seymour Canal, 15 miles above Point Hugh, is Tiedeman Island, which divides the canal for a distance of 8 miles. Above Tiedeman Island is another large island called Swan Island, and there are many small islets, rocks, and ledges. The waters of the canal are, in general, deep, and passing to the eastward of Tiedeman and Swan islands may be navigated to its head, though above the former the passage is narrow and somewhat intricate, and should not be attempted without local knowledge. Moderate-sized vessels might, if necessary, find a contracted anchorage at the extreme head of the canal, which is separated by a portage of less than  $\frac{1}{2}$  mile from Oliver Inlet, which enters Admiralty Island from the western branch of Stephens Passage.

On the western shore of Seymour Canal, 9 miles above Point Hugh, is Mole Harbor, about 2 miles in length by nearly 1 mile in breadth, with soundings from 12 to 25 fathoms. A mud flat, nearly bare at low water, extends  $\frac{3}{4}$  mile out from the head of the harbor with deep water close to its edge. Near the middle of the entrance is Beacon Rock, small and bare, with another bare rock about 200 yards inside of it. The ground is foul between Beacon Rock and the southern entrance point. A small bare rock, called Rasp Ledge, lies  $\frac{1}{4}$  mile off the northern entrance point, which is called Flaw Point. At low water all dangers show; the shores are bold-to.

## DIRECTIONS FOR MOLE HARBOR.

Enter midway between Flaw Point and Beacon Rock, and anchor in 13 to 17 fathoms, sticky bottom, at  $\frac{1}{4}$  mile off shore, about 1 mile within the harbor. On the western shore of the canal, about  $1\frac{1}{2}$  miles below Beacon Rock, is another indentation, marked by two islets at its entrance, in which a small vessel might find anchorage. Pass in close around the N. side of the western islet and anchor in 6 fathoms about 300 yards from that islet bearing N. A sand spit extends about 100 yards S. of the islet. This cove is bare at low water nearly  $\frac{1}{2}$  mile from its head.

On the western shore of the canal, abreast the NW. end of Tiedeman Island, is a spacious bay called Windfall Harbor. A large and high island called Windfall Island lies in the middle of the entrance. The harbor is about 4 miles in length and about  $\frac{3}{4}$  mile in width. At its head are extensive mud flats, and a long bight on its northern shore is also dry at low water. The entrance is on the S. side of Windfall Island, the passage on the N. side being foul. The soundings in the harbor are from 11 to about 25 fathoms. No particular directions are necessary. Enter S. of Windfall Island, and anchor anywhere in 15 to 17 fathoms, sticky bottom, preferably on the southeastern shore.

Windfall Harbor can only be reached by the channel W. of Tiedeman Island, which is about  $\frac{3}{4}$  mile in width, and an average depth of nearly 40 fathoms. In using this passage the western shore, which is bold, should be kept aboard to avoid the patch of sunken rocks lying  $2\frac{1}{2}$  miles above the SE. point of the island, and about 600 yards off the eastern shore.

**Tides.**—At both Mole and Windfall harbors it is high water, full and change, at about 0<sup>h</sup> 20<sup>m</sup>, with an average rise and fall of 14 feet.

A trail, used by the Indians, leading to the Kootznahoo country, is reported to exist in the vicinity of Windfall Harbor.

The eastern shore of Frederick Sound, from Cape Fanshaw N. to Point Windham, is irregular and much broken by deep inlets extending into the mainland.

Cape Fanshaw is a long, low, wooded point, terminating in a moderately long sand spit, with a large boulder at the extreme end and deep water close-to. From the cape the eastern branch of the sound, already described, extends for nearly fifty miles easterly to Dry Strait, at the mouth of the Stikine River.

Cape Fanshaw is in—

Latitude.....	57° 11' 00" N.
Longitude.....	133° 33' 57" W.

Declination 30° 13' 48" E., in 1889. From it Point Windham bears NW. by N., 24 miles distant; the southeasternmost of the Five Fingers bears NW. by W., distant  $5\frac{1}{2}$  miles; Sail Island bears in the same direction, distant 11 miles; Point Hugh bears NW.  $\frac{3}{4}$  W., distant  $24\frac{1}{2}$  miles, and Point Gambier bears NW. by W.  $\frac{1}{4}$  W., distant  $17\frac{1}{4}$  miles.

The land to the N. of Cape Fanshaw forms an extensive bight, called Fanshaw Bay. Whitney Island,  $2\frac{1}{2}$  miles long NW. by W.,  $\frac{1}{2}$  mile wide, low and heavily wooded, lies at the bottom of the bight, separated from the mainland by Cleveland Passage, about  $\frac{1}{2}$  mile in width, and forming an excellent harbor.

Storm Islands, lying S SW. from the middle of Whitney Island, are a small group of islets and bare rocks. The outermost of this group, called Bird Rock, is a bare rock about 25 feet above high water, bearing from Cape Fanshaw NW.  $\frac{1}{2}$  W. a little less than  $1\frac{1}{2}$  miles. The largest of the Storm Islands is wooded and lies  $\frac{1}{4}$  mile from Whitney Island, with a deep passage between. The navigation of this passage is narrowed to  $\frac{1}{2}$  mile by a ledge, bare at low water, lying a little less than  $\frac{1}{4}$  mile from Storm Island in the direction of its length. Ledges and shoal water extend  $\frac{1}{8}$  mile to the westward of Bird Rock, and there is no safe passage through the group.

The S. end of Cleveland Passage, called South Passage, is narrowed to a little less than  $\frac{1}{4}$  mile by a projecting, rounded point of the mainland, and is still farther narrowed to less than  $\frac{1}{8}$  mile by projecting sand spits, but having a least water in mid-channel of  $11\frac{1}{2}$  fathoms. On either side of South Passage are East and West spits, projecting to the northward and visible at low water. The depth of water in Cleveland Passage is from 9 fathoms on a bar extending across the southern end to 70 fathoms in mid-channel at the northern end.

**Anchorage** may be had in from 9 to 20 fathoms from  $\frac{1}{2}$  to  $\frac{3}{4}$  mile N. of the narrowest part of the South Passage. The bottom is hard to the lead, but the anchor, if kept clear in swinging to the tide, will soon work into a good stiff holding ground. The shores on either side are bold-to, and on the mainland are steep and rise rapidly to high, wooded hills.

The gales from W. to E. through S. blow off the high land in heavy gusts, but bring in no sea, and the holding ground is good; winds from W. to N. bring in a slight swell but do not appear to blow home.

The flood tide runs northward through South Pass with a strength of about  $1\frac{1}{2}$  knots, but sometimes in southerly winds this is reversed.

No particular directions are necessary. There are no known dangers, and the chart is the best guide. All the reefs show at low water, and at high water by giving all salient points a berth of  $1\frac{1}{2}$  cables everything is clear to enter.

## PORT HOUGHTON.

**McNairy Point**, a flat, projecting, rocky point, with ledges nearly awash at high water, is the N. entrance point to Cleveland Passage. Ledges, marked by kelp, extend a short distance off the northern end of Whitney Island.

**Steamboat Bay** is on the N. side of McNairy Point, with Foot Island on its northern side. This bay is about  $\frac{1}{2}$  mile in length by  $\frac{1}{4}$  mile in width, and has 22 fathoms of water; with the near proximity of Cleveland Passage it affords no advantage as an anchorage. Foot Island is connected by a sand spit with the small islet at the bottom of the bay. The narrow passage on the N. side of Foot Island might afford shelter to small vessels in 7 to 10 fathoms abreast the middle of the island.

**Port Houghton**, about 9 miles above Cape Fanshaw, is an extensive bay which extends from its entrance 12 miles in an ENE. direction, terminating in an extensive salt-water lagoon, the entrance to which is entirely dry at low water.

**Point Walpole**, the southern entrance point to Port Houghton, is on the westernmost of the group of islets on the S. side of the bay, and bears from Bird Rock N. by W., distant  $6\frac{1}{2}$  miles. The largest of this group of islets, lying  $1\frac{1}{2}$  miles inside the entrance, is **Robert Island**, low and wooded. **Walter Island**, moderately high, and wooded, lies 7 miles within the bay; SW. of this island are several rocks that show only at low water; to the eastward of Walter Island the bay curves somewhat and narrows gradually to its head. The chain of islets and rocks, of which Robert Island is the largest, extends 3 miles E. by N. from Point Walpole.

The shores between Point Walpole and Steamboat Bay form a rather deep bight and are very foul, and should not be approached nearer than  $\frac{1}{2}$  mile.

**Point Hobart** is the northern entrance point to Port Houghton; it is a broad, steep, and wooded, rounded point, about 1,500 feet high, facing to the SW., and bears N. by W.  $\frac{1}{2}$  W., distant about 4 miles from Point Walpole. Shoal water and rocks, marked by kelp, extend about 400 yards off the point.

The waters of Port Houghton are very deep, and it affords no shelter. An exposed anchorage, the only one in the bay, may be found on the southern shore about  $1\frac{3}{4}$  miles to the eastward of Robert Island, in about 15 fathoms, hard bottom, about  $1\frac{1}{2}$  cables off shore, with The Twins open half a point W. of Point Hobart. This anchorage is open to winter gales, and at times a heavy swell rolls in when there is no local wind. The near proximity of Cleveland Passage leaves Port Houghton an undesirable anchorage.

**The Twins**, lying WNW.  $3\frac{1}{2}$  miles from Point Hobart, are two small islets, wooded, 200 feet high, and are  $\frac{5}{8}$  mile apart. Between these islet and Point Hobart is the entrance to Hobart Bay; this bay, of an irregular S-shape, extends about 6 miles in a general NE. direction, terminating at its head in an extensive salt-water lagoon, the entrance to which is entirely dry at low water. Directly within the entrance is a wooded islet 450 feet high, with a smaller one close to its NW. side. The entrance to Hobart Bay is  $1\frac{3}{4}$  miles wide; off its SE. entrance point a ledge, bare at low water and probably marked by kelp, extends  $\frac{1}{2}$  mile off shore. About  $\frac{1}{2}$  mile inside the Entrance Islet, projecting points, between which is a bar with  $5\frac{1}{2}$  fathoms at low water, narrows the bay to  $\frac{1}{4}$  mile, from which it again widens out to  $\frac{3}{4}$  mile. On the NW. side, just within these inner points, a narrow arm leads to an inner basin about  $\frac{1}{4}$  mile in diameter, where a contracted anchorage in 10 fathoms might be found; to enter this basin pass to the northward of all the rocky islets at its entrance. The waters of Hobart Bay are deep, and it does not afford an anchorage except as noted.

In the broad part of Frederick Sound, SW.  $\frac{1}{4}$  W.  $2\frac{3}{10}$  miles from the northwestern of The Twins, and NW.  $\frac{3}{4}$  N. from Bird Rock, is a sunken rock, not marked by kelp, and having over it 21 feet at low water. The range of the SE. tangent of The Brothers, over the middle of Sail Island, crosses this dangerous rock, which is almost directly in the track of vessels bound into Stephens Passage from Cape Fanshaw. The rock is only about 35 yards in diameter, and is surrounded by depths of 11 to 30 fathoms.

This rock and the  $8\frac{1}{2}$ -fathom shoal, noted 2 miles E. by S. from Point Hugh, appear to be high pinnacles of a ridge extending entirely across Frederick Sound from Point Walpole to Point Hugh, and on which the depths vary from 50 to 90 fathoms, increasing on either side; nearly midway between these pinnacles a sounding of 24 fathoms is noted.

**Sunset Island** lies 5 miles NW. from The Twins; it is nearly round, about  $\frac{5}{8}$  mile in diameter, wooded, and 400 feet high, with deep water close-to. This island lies about 2 miles off the mainland, which is somewhat irregular, and falls rapidly to the water line; a line of kelp-marked ledges extends a short distance off the shores.

**Windham Bay** has its entrance N.  $\frac{1}{4}$  W. from Sunset Island; it is a narrow, deep inlet, extending to the NE. about 6 miles. In the middle of the entrance is a small, compact group of wooded islets, with a deep passage on either side; off the NW. entrance point, close to shore, is another small, compact group of islets. From its entrance, which is  $1\frac{1}{2}$  miles wide, Windham Bay narrows rapidly to a neck  $\frac{1}{2}$  mile wide and  $\frac{1}{2}$  mile long, connecting with a deep inner basin nearly 4 miles in length and  $\frac{1}{2}$  mile wide. This narrow neck is still farther narrowed to 100 yards by a rocky ledge, visible at low water, on its northern side, and between which and the southern shore is a bar with 7 fathoms least water. The waters of Windham Bay are very deep; an indifferent anchorage might be had at the extreme head

of the bay on the NW. side of the mud flat. A small stream from the southeastward enters Windham Bay at its head; a few miles up this stream placer mining on a small scale has been carried on for a number of years. The mining camp is called "Chuck."

To enter the inner harbor, keep the southern shore of "the neck" aboard at from 30 to 50 yards distance.

An indifferent temporary anchorage in deep water close to shore might be found on the northern shore about 1 mile from the entrance islets.

Point Windham, the NW. entrance point of Windham Bay, is a flat-topped bluff, 2,500 feet in height, descending rapidly to the water; the upper part consists of bare terraces; the lower part is wooded. Point Windham is 24 miles NW. by W. from Cape Fanshaw, and from it Point Hugh bears SW. by W.  $\frac{3}{4}$  W., distant  $7\frac{3}{4}$  miles.

## STEPHENS PASSAGE.

At the line of Point Windham and Point Hugh the waters of Frederick Sound cease under that name, the broad deep channel continuing to the northwestward being known as Stephens Passage.

This passage extends in a general NW. by W. direction for 40 miles to Point Arden, where an abrupt turn to the SW. by W. is made and the passage continues until it joins Lynn Canal at Point Retreat.

The waters of Stephens Passage are everywhere deep, with usually bold shores. On its eastern and northern shores are several harbors and indentations, some of which afford most excellent anchorages.

On the eastern shore,  $5\frac{1}{2}$  miles above Point Windham, is Point League, the southeastern point of entrance to a narrow inlet extending 2 miles in an ENE.  $\frac{1}{2}$  E. direction. This inlet is of no interest to navigation. Its northern entrance point is called Point Lookout, from which, N NW.  $\frac{1}{4}$  N.  $4\frac{1}{2}$  miles, is Point Astley, the southern entrance point to an extensive inlet, called Holkham Bay. The shore between these points is somewhat irregular and more or less foul, and midway between is a small group of islets close to shore; SW. by W. nearly  $\frac{1}{4}$  mile from Point Astley is a reef, bare at low water, and S.  $\frac{1}{2}$  W.  $\frac{3}{4}$  mile from the point is a small islet.

Holkham Bay.—Point Coke, the northwestern entrance point to this bay, is  $4\frac{7}{8}$  miles NW.  $\frac{1}{4}$  W. from Point Astley. A cove about  $\frac{1}{2}$  mile in extent, lying close under the NE. side of Point Coke, might afford a lee and anchorage with heavy NW. winds blowing down the passage.

Harbor Island, in the middle of the entrance to Holkham Bay, is high and wooded, about 1 mile in length E. and W., E. of which, within  $\frac{1}{2}$  mile, is a group of 5 small islets, the small southernmost one being called Round Islet. There is no safe passage through this group of islands. Immediately within this group Holkham Bay divides into two extensive arms. The southern one, called Endicott Arm, 25 miles long, with an average width of 1 mile, extends in a general E. by S. direction. On the northern shore of this arm, about midway of its length, is a narrow inlet extending 5 miles to the N. by W., and called Ford's Terror. A glacier, about  $\frac{1}{4}$  mile wide, terminating at the water, is at the head of this arm. The narrowest part of this inlet is but 100 yards wide, and through it the tides rush with great force.

Sanford Cove, on the southern shore of Endicott Arm, about 5 miles within the entrance, is the only available anchorage in Holkham Bay, but its depth of 35 fathoms is too great to make it desirable for any length of time. In mid-channel of the arm, abreast the cove, is Sumdum Island, about  $1\frac{1}{4}$  miles long, and midway between it and the northern shore are two small islets called the Bushy Islands.

At the head of the arm are the Dawes Glaciers, extending to the water's edge with widths of  $\frac{5}{8}$  and  $\frac{1}{4}$  mile, respectively.

Tracy Arm, the northern arm of Holkham Bay, takes a general NW. by N. direction for 9 miles, then turns to the E. by N. for 13 miles to its head, where there are two large glaciers, called the Sawyer Glaciers, extending to the water's edge, with widths, respectively, of  $\frac{5}{8}$  and  $\frac{3}{8}$  mile. The arm is about  $\frac{1}{2}$  mile in width.

Besides the glaciers noted there are many more having terminal moraines between the mountain peaks. The largest of these is nearly opposite the entrance to the bay, and is called Sumdum Glacier. Mount Harrison, the highest peak in this vicinity, lies back of this glacier.

On the western shore of Tracy Arm, about 4 miles within the entrance, is an arm extending to the NW. by W. for 2 miles. It does not afford an anchorage.

From the mainland NE. of Harbor Island a long, narrow sand-spit extends toward that island. It is surrounded by extensive flats and boulder patches, bare at low water, nearly closing the entrances to both arms. The western entrance point to Endicott Arm is a long, narrow sand-spit extending to the W NW. At high water it shows as an island outside the point;  $\frac{1}{4}$  mile N. of it are two sandy spits nearly awash at high water, and usually covered with drift wood. The whole is called Wood Spit, between which and the shoal water off the mainland is a deep navigable channel  $\frac{1}{2}$  mile wide, and having not less than 25 fathoms, leading into Endicott Arm. The banks of both shoals are steep-to.

The entrance to Tracy Arm is about 1 mile in width, but the navigable channel is narrowed to  $\frac{1}{2}$  that distance by the extension, in patches always covered, of the shoal off the spit that divides the two arms, and by a sunken rock and shoal lying nearly  $\frac{3}{8}$  mile off the western entrance point.



The water in both arms is very deep, in some places more than 200 hundred fathoms. The tides are very strong, and in summer there is much floating ice, rendering the navigation somewhat unsafe. In both arms the shores are steep and high. The scenery in Tracy Arm is particularly grand, the shores rising almost perpendicularly and showing the marks of receded glaciers. Ledges containing both gold and silver have been discovered on this bay.

The desire to view the glaciers and the scenery would be the only reason for navigating Holkham Bay and its arms.

**To enter Endicott Arm.**—Follow around the S. side of Harbor Island and the Round Islet group at  $\frac{1}{4}$  mile distance until the SW. point of Harbor Island shows midway between Round Islet and the largest one of the group lying N. of it, bearing W.  $\frac{3}{4}$  S., when steer E.  $\frac{1}{4}$  N., which carries clear in mid-channel.

**To anchor in Sanford Cove.**—When in line between Wood Spit and Sand Spit, a small sand islet on the northern side, steer SE. by E.  $\frac{1}{2}$  E., and anchor in the cove with just swinging room in 30 to 35 fathoms, perfectly protected from all winds, and fairly clear of floating ice.

Tracy Arm is somewhat difficult of access on account of tide whirls and floating ice, and no ranges ahead can be given.

**To enter Tracy Arm** pass close to the western point of Harbor Island and bring that point astern bearing S. by W., and steer N. by E., which carries in clear in mid-channel with not less than 12 fathoms. There is no anchorage in this arm.

On the N. side of Harbor Island the passage between that group and the projecting shoals from the mainland is  $\frac{3}{4}$  mile wide, with depths of not less than 23 fathoms in mid-channel. At low water both shores are very steep-to.

There is an anchorage in 8 to 20 fathoms back of the Round Islet group, but the position is exposed. The tides are very strong, and in summer there is much floating ice.

A temporary anchorage may also be had SE. by E. of Harbor Island, in the bight between Point Astley and Wood Spit.

Strong tide rips were observed at the entrance to Holkham Bay.

At Point Coke, Stephens Passage is 6 miles wide. The western shore from Point Hugh to Point Arden is nearly straight, with slight indentations and irregularities of points. There are no harbors nor anchorages on that side, and no outlying dangers, except South Island, which lies 26 miles above Point Hugh and a little more than  $\frac{1}{2}$  mile off the western shore. This island is  $\frac{1}{2}$  mile in length and  $\frac{1}{2}$  mile in width, with a ledge of rocks extending  $\frac{1}{2}$  mile to the southward and eastward. The greater part of this ledge is covered at ordinary high water; the island is thickly wooded. This island and ledge are well out of the track of passing vessels, but in foggy weather might prove a danger;  $1\frac{1}{4}$  miles above South Island is Station Point, a small islet  $\frac{1}{2}$  mile off the point, having a few trees and some thick brush upon it. The bight between South Island and Station Point does not afford an anchorage.

Off Point Hugh the water averages about 175 fathoms in depth, shoaling gradually to 100 fathoms off Point Arden.

The Midway Islands lie W.  $\frac{3}{4}$  N.  $4\frac{1}{2}$  miles from Point Coke, and two miles off the eastern shore of the passage. The group consists of two small, low, wooded islets, with rocks between them that are just awash at extreme high water. A ledge of rocks extends less than  $\frac{1}{4}$  mile SE. of the southernmost island, the whole forming an obstruction  $\frac{3}{4}$  mile in length SE. and NW., and  $\frac{1}{4}$  mile in breadth, with deep water close-to.

The passage eastward of these islands is very deep. Steamers, however, invariably pass to the westward of them, midway to the western shore.

On the eastern shore,  $9\frac{1}{2}$  miles above Point Coke, is Point Anmer, the southeastern entrance point of Port Snettisham; Point Styleman, the northwestern entrance point, lying 3 miles NW. by W. from it. The port is a large irregularly T-shaped bay, consisting of the main entrance and the north and south arms; the former is 4 miles long in a NE. direction, and averaging about 1 mile in width. The north arm, extending in a general northerly direction, is 8 miles in length, and averages about  $\frac{1}{2}$  mile in width; the south arm is 4 miles long in a nearly SE. direction, and is over 1 mile in width. Near the middle of the eastern shore of the south arm an inlet about  $\frac{3}{4}$  mile wide extends  $1\frac{1}{4}$  miles to the NNE. to the mud flats of the Whiting River.

Within the north arm about  $1\frac{1}{4}$  miles is Fannie Island, close to the western shore; in the bight to the westward of this island is the NW. arm, about  $\frac{1}{2}$  mile in width.

Port Snettisham is entirely free from dangers, but on account of the great depth of water is not suitable as an anchorage, though in case of necessity a vessel might anchor in about 20 fathoms at the head of either the north or south arm, close to the flats, which bare at low water. Strong tide rips were observed at the entrance to Port Snettisham.

Speel River empties into the north arm at its head; this river is fed by the heavy winter rains and the melting snow in summer, and is very shallow, with a constantly shifting channel which is hardly navigable by canoes on account of the swift running water. In the channel the depth averages not over 2 feet. At the head of the north arm, near the mouth of Speel River, are some remarkable perpendicular cliffs rising abruptly from a depth of 40 fathoms of water. The scenery looking up Speel River is considered among the finest in Alaska.



At the head of the south arm are extensive flats which bare at low water for the distance of 1 mile, and are over  $\frac{1}{2}$  mile in width; back of the flats is a low valley about 5 miles in length, connecting with Holkham Bay. This valley is divided from Stephens Passage by a short range of mountains having 3 prominent peaks from 2,300 to 3,000 feet high; the valley is filled with a dense growth of brush, rendering it almost impassable. Through it and over the flats runs the Sweetheart River, and near its mouth are the beautiful falls of the same name.

Whiting River empties into the short inlet on the E. side of south arm; this river is navigable for canoes and small boats for about 4 miles from the mud flats at its mouth.

The small NW. arm near Fannie Island is not navigable; it consists only of flats which bare at low water.

About  $\frac{3}{4}$  mile above Point Styleman is a small group of rocks about  $\frac{1}{2}$  mile off shore; they stand from 3 to 5 feet above ordinary high water. Four and a quarter miles above the point is the entrance to Limestone Inlet, a narrow arm extending less than a mile to the NE., and at the head of which are extensive flats covered at high water. The depth of water in the inlet is less than 20 fathoms, and a vessel may anchor anywhere in mid-channel, but the holding ground is not very good, and with the close proximity of Taku Harbor vessels would seldom find it necessary to enter this inlet.

On the eastern shore, between Limestone Inlet and Taku Harbor, and about  $\frac{1}{2}$  mile from the former, lies an outlying pinnacle rock something less than  $\frac{1}{4}$  mile off shore; during spring tides it is covered by 7 feet at high water and projects 14 feet at low water.

Taku Harbor has its entrance  $6\frac{1}{2}$  miles above Point Styleman. This very snug harbor is about  $\frac{1}{2}$  mile in length by a little less than that distance in width, with an entrance nearly  $\frac{1}{4}$  mile in width between Stockade Point on the southeastern side and Grave Point on the northwestern.

Stockade Point is low and thickly wooded, deriving its name from the stockade fort built there by the H. B. Co., but of which all traces have long since disappeared.

Grave Point is low and wooded, but rises rapidly back to Taku Mountain, 2,000 feet high. When nearing the harbor from the southward the entrance is hidden until close-to, but its position is readily known by the projecting high land, and by the thick, dark-green foliage of Grave Point standing out in strong relief against the background of the more distant high mountains. The entrance appears narrow but soon widens out inside of Stockade Point. The quality of the holding ground is variable; just inside Stockade Point, and also on the NW. side, the bottom is hard, composed of sand and gravel, but in the middle, soft muddy bottom is found. At the head of the harbor is a picturesque Indian village; mud flats, bare at low water, extend about  $\frac{1}{4}$  mile out from the shore line in front of the village. Off Grave Point a ledge, covered at high water, extends out about 60 yards. There are no hidden dangers in the harbor; the depths vary from 60 fathoms in the entrance to 5 fathoms close to the edge of the mud flats. The anchorage is usually in from 10 to 12 fathoms near the middle of the harbor, about midway on the range between the extreme cluster of graves to the eastward of the village and the inner point of entrance on the eastern side. A small lake lies about a mile to the northward of the village.

An eddy current into Taku Harbor from Stephens Passage is sometimes noticed with the flood tide. Large icebergs from Taku Inlet have been seen to enter the harbor and drift slowly as far as the anchorage, thence moving to the eastward, finally ground in the bight inside Stockade Point.\*

No particular sailing directions are necessary for Taku Harbor. It is high water, full and change, at 0<sup>h</sup> 35<sup>m</sup>, with a mean rise and fall of 14 feet, and an extreme rise of 24 feet.

Grand Island lies in the middle of Stephens Passage, 3 miles above Taku Harbor; it is 2 miles long NW. and SE., and about 1 mile wide, and consists of a mountain over 1,500 feet high with three distinct knolls upon it, rising abruptly from deep water varying in depth from 20 to 70 fathoms. On its northeastern and southeastern shores are rocky ledges covered at extreme high water, and projecting out from 100 to 250 yards; the western shore is very bold-to. There is very deep water on both sides of the island; the channel to the eastward is that used by the steamers.

Slocum Inlet lies on the eastern shore,  $2\frac{1}{2}$  miles N. by E. from Grand Island. This inlet is somewhat more than 1 mile in depth and less than half that width, but is nearly filled by mud flats that cover at high water. The water is deep close up to the mud flats, and it does not afford an anchorage.

On the western shore, W. from Grand Island, a broad bight having very deep water extends about  $1\frac{1}{2}$  miles into Admiralty Island; it does not afford an anchorage.

Point Arden lies 4 miles NW. by W. from Grand Island. It is the NE. point of Admiralty Island, and is described as a low, bluff, wooded point about 1 mile in width, and facing to the N.; between the angles of the point is a shallow bight with deep water close to shore. The western angle of the point lies  $2\frac{3}{4}$  miles E. by S. from Tantallon Point at the entrance to Gastineau Channel.

At Point Arden, Stephens Passage changes direction to WSW. with a width between 2 and 3 miles, until up with Point Young, 11 miles from Point Arden. At Point Young it widens out to 5 miles, forming Young Bay, narrowing again at 5 miles, at Horse Shoals to 3 miles.

Skull Island, a bare rock, 50 feet high with good water all around it, lies well off the entrance to Young Bay.

\* In 1886 one was noted by the U. S. S. *Pinta* to ground and remain in a measured depth of 10 fathoms.

Horse and Colt islands and Horse Shoals, reduce the main channel to a width of  $1\frac{1}{2}$  miles until up with Outer Point, the western end of Douglas Island. It is about 18 miles from Point Arden to Outer Point, and the best course is about mid-channel until up with Point Young, then gradually close the Douglas Island shore to  $\frac{1}{2}$  to  $\frac{3}{4}$  mile until up with Outer Point. This clears everything and avoids the half-tide Horse Shoals, which lie  $\frac{3}{4}$  mile NE. of Horse Island.

This section of Stephens Passage has a depth from 23 to 40 fathoms, and affords anchorage in foggy weather. Young Bay is a fair anchorage in summer. There is no anchorage in Auke Cove on account of shallow water.

**Fritz Cove.** About  $\frac{1}{4}$  mile N. of Outer Point lies Shaman Island, small, high, and wooded; this island forms the eastern point of the entrance to Fritz Cove. Portland Island, which is about 200 feet high, bearing WNW.  $\frac{1}{2}$  W. from Shaman Island, is the western point of the entrance.

**Dornin Rock**, with  $15\frac{1}{2}$  feet water over it, lies SW. of Shaman Island, distant  $\frac{3}{4}$  mile.

**George Rock**, which covers at spring tides, lies WNW.  $\frac{3}{4}$  mile from Shaman Island.

The best course in to Fritz Cove is to pass halfway between Portland Island and George Rock,  $\frac{1}{2}$  mile to the southward and eastward of Spuhn Island, and then follow the Douglas Island shore to the anchorage, which lies about  $2\frac{1}{2}$  miles from Shaman Island. The anchorage is easily found from Entrance Point, which is a tree-covered knoll, connected with the shore by a low spit. Anchor about  $\frac{3}{4}$  mile S.  $\frac{1}{2}$  E. of Entrance Point in 20 to 25 fathoms, soft mud. Entrance Point should not be approached nearer than  $\frac{1}{8}$  mile on account of the Gastineau Channel flats. Fritz Cove is a perfect shelter from all southerly winds and a good lee for the east winds, and is easy of access.

The western entrance to Gastineau Channel, which enters Stephens Passage between Entrance Point and Spuhn Island, is completely closed by sand flats, which are entirely bare at all neap tides and carry about 3 feet at high-water springs. These flats carry within  $2\frac{1}{2}$  miles of Juneau, where a channel of good depth is found, narrowing to about  $\frac{1}{16}$  mile opposite the Silver Bow basin and ending at Juneau.

The bight inside of Point Louisa and Shaman Island is full of small islands and reefs giving good shelter under their lee from northerly winds, but all these anchorages are exposed to the southward except Fritz Cove.

**Portland Island** lies  $2\frac{1}{4}$  miles WNW. of Outer Point. This island is  $\frac{3}{4}$  mile long and  $\frac{1}{2}$  mile wide, about 200 feet high and wooded; it extends in a WNW. direction and its northern end is prolonged by a reef which covers at high water, except two small patches  $\frac{1}{4}$  and  $\frac{1}{8}$  mile from the island. This reef or spit is  $\frac{3}{4}$  mile long and must be carefully avoided at high water; at low water everything shows. There is a clear passage both sides of Portland Island.

About 3 miles W. by N. of Portland Island is the S. end of Shelter Island, which has a general direction of WNW. for 8 miles with an average width of 1 mile, is wooded, high, and at its northern end reaches an altitude of 1,200 feet.

Stephens Passage ends at Shelter Island, which, with Lincoln, Hump, Ralston, and Little islands, separate Favorite Channel from Saginaw Channel and Lynn Canal.

The S. shore of Douglas Island is low and wooded, with small projecting points, and no known outlying dangers. The land rises rapidly back from the shore to the moderately high ridge extending the whole length of the island.

The northwestern end of Admiralty Island forms the southern shore of the western arm or branch of Stephens Passage, Point Arden being the northern angle around which the passage turns to the westward.

From Point Arden the shore extends in a general SW. direction for  $4\frac{1}{2}$  miles to the entrance to Oliver Inlet, extending  $2\frac{1}{4}$  miles to the S SE. into Admiralty Island.

**Oliver Inlet** has its entrance through a narrow neck about 1 mile in length, and averaging  $\frac{1}{2}$  mile in width, widening out to a greatest width of  $\frac{1}{2}$  mile. The inlet is only accessible at high water, to steam launches and smaller boats, the narrow entrance being barred at low water by a natural dam, formed by a nest of rocks, over which the water pours like a waterfall during the latter portion of the ebb tide. On the top of high water small vessels drawing not over 6 feet can enter with safety. The tide runs in and out with a velocity of from 6 to 8 knots an hour, forming heavy swirls. There is a portage of about  $\frac{1}{2}$  mile in length connecting this inlet with the head of Seymour Canal, and on this portage the Indians have placed skids for convenience in hauling over their canoes. Oliver Inlet has no practical value except such as is given by this portage.

From Oliver Inlet the shore trends nearly W. for about 4 miles, then curving slightly to the southward to Point Young, which is about 16 miles from Point Arden. About  $\frac{1}{2}$  mile W. of Point Young is a small cove called **Auke Bay**, on which is situated an Indian village. To the southwestward of Point Young is a rather broad and deep indentation called **Young Bay**, well off the entrance to which is Skull Islet, so named from its resemblance to the upper part of a human skull. From the SW. angle of Young Bay is a portage connecting it with Hawk Inlet, which enters Admiralty Island near Point Marsden. From Young Bay the coast trends northwestward to **Barlow Point**.

**Horse Island and Colt Island**, at low water connected by dry sand shoals, may be said to form one island, which extends about  $1\frac{1}{4}$  miles in a N NW. direction. The S. end of Horse Island lies W.

6 miles from Point Young and  $\frac{1}{2}$  mile from Admiralty Island. The Horse shoals, mentioned before, lie  $\frac{3}{4}$  mile NE. of Horse Island; they are bare at half tide.

A small ledge, which covers at half tide, lies NW.  $\frac{3}{4}$  mile from the N. end of Colt Island and  $\frac{3}{4}$  mile from Admiralty Island.

**Symonds Point**, projecting to the W NW., lies  $5\frac{1}{2}$  miles above Colt Island.

From Symonds Point a reef extends to the N NW.  $\frac{1}{2}$  W. nearly  $\frac{1}{2}$  mile. SW. of this point and reef is an anchorage in a cove of about  $\frac{1}{2}$  mile in extent, in 10 to 12 fathoms; the W. side of the cove is a narrow projecting ledge partly visible at high water and extending  $\frac{1}{4}$  mile to the northward of a small projecting point. This anchorage affords fair shelter from the SE., but is open to the northerly winter gales. From this cove to Barlow Point the shores are rocky.

**Favorite Channel** is the usual channel taken by the mail and other steamers passing up Lynn Canal from Juneau. A reef makes off the lower end of Shelter Island, on the Favorite Channel side, for  $\frac{1}{2}$  mile with  $2\frac{1}{2}$  fathoms water, wash rocks between it and the island.

**Strauss Rock**, a dangerous obstruction to navigation, lies  $\frac{1}{2}$  mile SSE.  $\frac{3}{4}$  E. from the nearest point of Shelter Island. From it the following bearings are taken:

Point Lena, N.  $\frac{1}{8}$  W.

North end of Portland Island, E.  $\frac{1}{8}$  S.

Barlow Point, W SW.  $\frac{3}{4}$  W.

This rock has 9 feet water at low-water springs, and is directly in the fairway rounding Shelter Island. To the northward and westward of Strauss Rock is a temporary anchorage in fine weather.

**Point Lena**, on the northeastern shore, lies  $2\frac{1}{4}$  miles W.  $\frac{3}{4}$  N. from Point Louisa. Extending to the NW. by W. for 10 miles from Point Lena is a chain of four small islets lying about 1 mile off the shore of the mainland.

**Aaron Island**, the southeasternmost of the chain, is 2 miles from Point Lena;  $\frac{1}{4}$  mile SE. by S. and  $\frac{3}{8}$  mile E.  $\frac{1}{4}$  N., respectively, from the SE. end of this island are ledges that show at low water.

**Eagle Reef**, nearly awash at high water, lies  $1\frac{1}{4}$  miles N NW.  $\frac{1}{4}$  W. from Aaron Island.

**Sentinel Islet** is 7 miles from Aaron Island. It is the northwesternmost of the chain. A reef extends  $\frac{1}{4}$  mile to the NW. from the islet. Sentinel Islet is nearly 2 miles off shore, and from both the NW. and SE. it appears to stand out well into the channel, and hence its characteristic name. To the northward of the islet, between it and the mainland, are Benjamin Islet and North Islets, low and wooded.

Midway between Sentinel Islet and Aaron Island are Gull Island and Bird Islet, lying about 1 mile off shore. Both are low and wooded.

North of Gull Island a large glacier, called Eagle Glacier, is visible from the water approaches in all directions.

**Vanderbilt Reef**, is on the W. side of Favorite Channel. It is 4 miles W. by N. from Sentinel Islet. Point Bridget bears from Sentinel Islet NW., distant about  $7\frac{1}{2}$  miles. Between them, and close to shore, are several wooded islands.

The NW. shore of Shelter Island is fringed by very narrow ledges visible at low water, and having deep water close-to. A sounding  $\frac{1}{2}$  mile SW. by W.  $\frac{1}{2}$  W. from Sentinel Islet gave 128 fathoms, muddy bottom. About  $\frac{1}{2}$  mile to the N NE. from Vanderbilt Reef are two soundings in 135 fathoms, and close to the reef is 16 fathoms.

A general course of about NW.  $\frac{5}{8}$  W. carries through Favorite Channel, Lynn Canal, up through Chilkat Inlet to the flats, and is the shortest route from Outer Point. In passing, close Gull and Sentinel islands to about  $\frac{1}{4}$  to  $\frac{3}{4}$  mile to clear **Poundstone Rock**, which has 16 feet of water and lies S.  $\frac{1}{4}$  E. from Sentinel Island, distant 1 mile.

From the rock the following bearings were taken:

To N. end of Lincoln Island, SE.  $\frac{3}{4}$  E.

To S. end of Benjamin Island, N.  $\frac{1}{2}$  W.

To Gull Island, W.  $\frac{5}{8}$  W.

Favorite Channel ends in Lynn Canal, between Ralston and North islands.

#### SAGINAW CHANNEL.

Passing Outer Point at a distance of  $\frac{1}{2}$  mile, a course W. by N. for  $6\frac{1}{2}$  miles carries to the middle of the entrance to Saginaw Channel, when a mid-channel course can be taken between Favorite Reef and Admiralty Island.

**Favorite Reef** covers at high water, is  $\frac{1}{2}$  mile long,  $\frac{1}{8}$  mile broad, and has a deep-water passage of  $\frac{1}{2}$  mile between it and Shelter Island. It is well marked by a red buoy, which is always left on the starboard hand going up the channel. After passing through Saginaw Channel, give Barlow Islands a berth of  $\frac{1}{2}$  mile, and haul over to pass the same distance from Point Retreat; this clears **Faust Rock**, which lies  $1\frac{1}{4}$  miles from Barlow Islands and in continuation of them, has 16 feet over it at low water, and is directly in the former steamer track.

## GASTINEAU CHANNEL.

## BARLOW COVE

has a general direction **SE.** for  $4\frac{3}{4}$  miles from the outer point of the Barlow Islands, with an average width of  $\frac{5}{8}$  mile. The bottom shoals gradually from 110 fathoms at the mouth to 23 fathoms at the anchorage. Coming in, favor the Barlow Islands side of the cove to avoid the foul ground which makes out about  $\frac{1}{4}$  mile inside of Point Retreat. There is a boat passage between Barlow Point and Barlow Islands, through which 20 feet can be carried, but it is unfit for vessels, and except at slack water is filled with tidal eddies and whirls. Barlow Cove is of no importance; the deep water and distance to the anchorage makes it unavailable for the steamers.

The surveying steamer *Patterson* laid in this cove for over a month in May and June, 1890, anchored at the head in 25 fathoms, soft mud, with room to veer. Very strong **SE.** squalls drew off the land at times, but the northerly winds did not blow home. In September of the same year the wind and sea came home, making a rather uncomfortable berth.

## GASTINEAU CHANNEL

enters from Stephens Passage and runs from Point Tantallon to the flats off Juneau, **W NW.  $\frac{1}{2}$  W.** 8 miles, gradually narrowing from  $1\frac{1}{2}$  miles at the entrance to  $\frac{1}{2}$  mile abreast Juneau Isle. Off Point Tantallon the depth is 40 fathoms, gradually shoaling for 3 miles to 19 fathoms, then deepening slightly to 25 fathoms, shoaling to 20 fathoms off Juneau.

A mid-channel course clears everything, slightly favoring the southern shore opposite the saw-mill at Sheep Creek, where the flats make out  $\frac{1}{4}$  mile, hauling a little to the northward when the saw-mill is abeam, to keep clear of the spit, which makes out  $\frac{1}{4}$  mile off Bullion Creek. Six miles from the mouth, on Douglas Island, is Douglas City, the site of the Treadwell gold mines, running a 240 stamp mill, said to crush 600 tons of rock daily.

Douglas City has a population of 340 whites.

Juneau. Two miles above Douglas City, on the **N.** shore, is Juneau City, having about 600 inhabitants (white) and about 200 houses. The best anchorage is off the mail wharf in 20 fathoms of water, soft bottom, with plenty of room to swing and veer chain. The strongest winds are in the winter, and draw down the mountain passes from the northward, in gusts, with terrific force. The **SE.** winds in summer seldom blow home, but when they do, they bring in a heavy sea, which makes an uncomfortable berth. Juneau is the headquarters of the prospectors in this part of Southeastern Alaska, and has a large trade. Supplies of all kinds, except coal, can be purchased. Fish, meat, and vegetables are always to be found here. Juneau is practically the head of navigation in Gastineau Channel, as the flats just above make out from both shores, although a narrow and deep channel makes between the flats, and not less than 3 fathoms of water can be carried for 2 miles or within  $\frac{1}{2}$  mile of Salmon Creek. Above this and up to Entrance Point, at the western end of Gastineau Channel, the channel is completely closed, only carrying 3 feet of water at high-water spring tides.

On the southern shore,  $\frac{1}{4}$  mile inside Tantallon Point, is Marmion Island, small, low, and flat, and close to the shore, with which it is connected at low water. The island is bare of trees, and at a distance resembles an old fortification.

About 6 miles above Marmion Island is a small wooded island lying about  $\frac{1}{2}$  mile off the southern shore, called Juneau Island.

There is a good though somewhat contracted anchorage in 12 to 15 fathoms between Juneau Island and the end of the wharf. From the western end of the island to the southern shore the water is shoal, and is a good place to beach a vessel for repairs or examination.

The southern shore of Gastineau Channel is generally rather low, rising more or less rapidly back to the higher land of Douglas Island, and is densely wooded. Shoal water extends but a short distance off shore, except at the mouth of a small creek nearly opposite the Juneau wharf, where a spit, bare at low water, makes out about 500 yards.

A vessel intending to remain for any length of time in Juneau would do well to buoy the anchor, so that its position may be known in swinging to the tide, which sets pretty regularly in and out of the channel.

The holding ground is good, and a clear anchor, with a good scope of cable will hold the ship. Southeast gales are liable at all seasons of the year; they are usually accompanied by rain, and bring in a somewhat uncomfortable sea, but are not always accompanied by the mountain squalls. The fall and winter gales are local in their effects, and it often happens that during their prevalence comparatively good weather will be experienced at Douglas City.

In Gastineau Channel the flood tide runs to the westward past Juneau about 2 knots an hour. It is high water, full and change, at about 0<sup>h</sup> 30<sup>m</sup>, and the average rise and fall is about 18 feet, with an extreme rise of about 24 feet.

## TAKU INLET.

From Grand Island **NW.** by **N.  $\frac{1}{2}$  N.** 6 miles is the entrance to Taku Inlet. The western entrance point of the inlet is Bishop Point, a long, rather low, projecting, bare point, lying 2 miles **E NE.** from

Point Salisbury; between the two points, and  $\frac{3}{4}$  mile from the latter, is a village of Taku Indians. A rounded projection of the mainland, called Point Greely, lying  $2\frac{1}{8}$  miles NE. from Bishop Point, may be considered as the eastern entrance point to the inlet.

From the entrance Taku Inlet runs N. 3 miles, thence NW.  $3\frac{1}{2}$  miles, changes direction off Jaw Point to NNW. for  $2\frac{1}{2}$  miles, then NNW.  $\frac{1}{4}$  W. 6 miles to  $\frac{1}{2}$  mile beyond Taku Point, where it divides, one arm running WNW. 4 miles, ending in a large discharging glacier, called Foster Glacier,\* the other arm running N. by E.  $\frac{1}{4}$  E. 1 mile, when it meets the flats of the Taku River. The whole length of the inlet is about 18 miles, with a width at the entrance of  $1\frac{1}{2}$  miles, opening out above Jaw Point to  $2\frac{3}{4}$  miles, decreasing at Taku Point, and again widening at the river and glacier basins.

Between Jaw Point and Taku Point the navigable channel is reduced in width by flats, which make off from both shores. The least water in the channel is 9 fathoms, and the best guide for the navigator is the chart. Range Point bears N. by W.  $\frac{1}{2}$  W. from Jaw Point, distant 3 miles. Jaw Point, just open of Range Point, carries over the flats and through the narrows in best water. There is no anchorage in the inlet, on account of the vast amount of floating ice from the glacier. The easterly winds blow out of the inlet with great force at times. The glacier at the head of the inlet, called Foster Glacier,\* and also the large moraine glacier, called Windom Glacier,\* make this inlet one of the show places for the excursion steamers.

The land between Taku Inlet and Gastineau Channel is high and rugged, and glaciers, some of large size, fill every ravine.

Taku River is reported to be navigable for canoes a distance of 60 miles. The pass up the river has been used by the prospectors going to the headwaters of the Yukon, who do not report favorably upon it.

The current is very swift. At a distance of some 45 miles from the inlet the river receives a branch called the South Fork of the Taku, which has its source in Lake Kennicott, a small sheet of water some 50 or 60 miles ESE. from the junction of the South Fork and the Taku, and close to the headwaters of the First North Fork of the Stikine. Not many miles from this locality Lake Ketchum, another small lake, gives rise to a somewhat shorter stream, which has been called the Etsakuga. This, flowing parallel with the South Fork, joins the Taku some 10 miles N. of the mouth of the South Fork. At the same point the North Fork of the Taku coalesces with the Etsakuga to form the Taku proper. The North Fork enters the junction from the NNW., its headwaters spreading to the NE. and N. One of its affluents heads in a small spring or pool less than 1 mile from a stream which feeds Lake Atlin and other lakes of the Yukon watershed which enters the ocean nearly 1,000 miles in a direct line from the mouth of the Taku. The South Fork and the Etsakuga flow through valleys of which the latter is said to be rather wide and fertile. All these branches were roughly explored by parties of the Western Union Telegraph Expedition in 1865, '66, '67, in search of a telegraph route toward the Yukon Valley.

Like Gastineau Channel, the conformation of Taku Inlet is such that winter gales sweep down the inlet and across Stephens Passage with terrific fury, often accompanied by a blinding snow storm.

These winds are not felt after the lee of Bishop Point is reached, and little or no wind will usually be found in Gastineau Channel. In winter a very low barometer in this vicinity usually indicates snow, and is not necessarily accompanied or followed by high winds.

#### GENERAL SAILING DIRECTIONS.

##### FREDERICK SOUND AND STEPHENS PASSAGE, FROM CHATHAM STRAIT TO POINT ARDEN.

From Wrangell Strait, after clearing the kelp-marked shoals at the northern entrance, take a course to pass in mid-channel to the southwestward of the Soukhoi Islands, and following the SW. shore at a distance of  $\frac{1}{2}$  mile until up with the Cape of the Strait, from a point  $\frac{1}{2}$  mile N. of which a due W. course for 19 miles will pass  $1\frac{1}{2}$  miles S. of Cape Fanshaw. This course follows the northern shore at the distance of 1 mile from Bay Point to Cape Fanshaw, a distance of  $9\frac{1}{4}$  miles.

If bound into Portage Bay a course more to the southward would be taken, following the southern shore at a distance of  $\frac{1}{2}$  mile until the entrance to the bay is open, when it can be entered according to the directions already given.

If bound to Chatham Strait.—From the point  $\frac{1}{2}$  mile N. of Cape of the Strait a course W. by S. for  $7\frac{1}{4}$  miles will bring the entrance to Portage Bay bearing S., when a course W. by S.  $\frac{1}{2}$  S. may be steered with Turnabout Island just open to the southward of that course and distant  $22\frac{1}{2}$  miles. Pass in mid-channel between Turnabout Island and Pinta Rocks on a SW.  $\frac{1}{4}$  S. course, and when the rocks are abeam, a SW. by S.  $\frac{1}{4}$  S. course will carry clear  $\frac{1}{2}$  mile to the southeastward of Yasha Island.

\* Named by Superintendent U. S. Coast and Geodetic Survey.

## CHATHAM STRAIT—DESCRIPTION.

If bound to **Security Bay**.—Steer **S SW.** from the **Pinta Rocks** abeam until the bay opens **E.** by **S.  $\frac{1}{2}$  S.**, when it may be entered according to previous directions.\*

From **Cape Fanshaw** bound to the northward.—Round the cape at a distance of 1 mile; when it bears **NE.** a **NW.** by **N.** course carries clear  $\frac{1}{2}$  mile **W.** of **Bird Rock** and  $\frac{1}{2}$  mile **E.** of the **SE.** **Five Finger Islet**. When that islet bears **SW.** a course **NW.  $\frac{1}{4}$  N.** for 19 miles carries clear to a mid-channel entrance to **Stephens Passage**, abreast **Point Hugh**. This course passes 1 mile **W.** of the  $3\frac{1}{2}$  fathom shoal noted as lying 3 miles **SW.  $\frac{1}{2}$  W.** from **The Twins**.

For the use of **Cleveland Passage** and other bays in the vicinity the chart is the best guide.

From **Chatham Strait**, if bound into **Stephens Passage**, pass to the eastward of **Yasha Island** about 1 mile and steer **N.** by **E.**; this course carries about 2 miles off the **Admiralty Island** shore, and passes about  $\frac{3}{4}$  mile **E.** of **Yelowy Island**, which is bold-to, and the same distance **W.** of **Round Rock**, which is also bold-to, and runs a little **E.** of mid-channel between **The Brothers** and **False Point Pybus**. Continue this course until **Sail Island** is in range with the western side of the **Five Finger Group**, when a **NNW.  $\frac{1}{4}$  W.** course carries clear to a mid-channel entrance to **Stephens Passage**, with **Point Hugh** bearing **SW.  $\frac{1}{2}$  S.**, distant  $3\frac{1}{4}$  miles.

From this point the course up **Stephens Passage** is **NW.  $\frac{5}{8}$  W.** for 36 miles. On this course the nearest point of the western shore is passed  $\frac{7}{8}$  mile distant; thence the course gradually approaches the eastern shore, passing **Grave Point** at the distance of  $\frac{3}{8}$  mile and the same distance **E.** of **Grand Island**. When **Cove Point**, on the western shore, **NW.** from **Grand Island**, bears **SSW.  $\frac{1}{2}$  S.**, a **W.  $\frac{3}{4}$  N.** course leads into **Gastineau Channel**. In this latter channel a course leading a little to the southward of mid-channel should be taken to avoid the shoal bank extending out from **Sheep Creek** at the sawmill.

A vessel may anchor in about 12 to 15 fathoms midway between the end of **Treadwell Wharf** and **Juneau Islet**, or an anchorage 1 to 2 cables **SSW.** of the **Juneau Wharf** in 19 fathoms may be taken.

A mid-channel course is safe to enter **Taku Inlet**.

Directions for the use of the various harbors of **Stephens Passage** are included in their descriptions.

**Tides**.—According to the observations of the surveying officers in 1888, in the western branch of **Stephens Passage** the flood tide from **Chatham Strait** flows through **Saginaw Channel** and to the eastward, meeting in the vicinity of **Point Arden** the flood tide flowing to the northward through the southern branch of the passage from **Frederick Sound**. The action of the ebb is the reverse of the flood.

## CHATHAM STRAIT.

This is the most extensive of the inland passages of the **Alexander Archipelago**. The expanded portion of the strait, at its southern entrance, was named **Christian Sound** by **Colnett**, in 1789. It is still sometimes known by that name.

**Chatham Strait**, for the purposes of description, will be considered as extending from **Capes Ommaney** and **Decision** to **Point Converden**, where it divides into two branches. The western branch is known as **Icy Strait**, the other branch, to the northward, being known as **Lynn Canal**.

The surveys have not yet reached this passage, so that descriptions can only be given as taken from notes and maps of the early navigators, with some few additions of a later date. Some few harbors have been surveyed, and the general navigation of the strait is well known to the pilots who now navigate these waters. It is not probable that in the strait any unknown dangers exist.

At its southern entrance **Chatham Strait** is about 16 miles wide, but has an average width of only 5 miles. As here considered its length is about 135 miles, with a general direction of about **NW.  $\frac{1}{4}$  N.** By the present charts a course steered according to the channel as there laid down would take a vessel on shore. **Point Marsden** is laid down too far to the westward, and **Point Augusta** and **Point Couverden** somewhat too far to the eastward. From **Point Retreat** a single course can be steered, in mid-channel, to the entrance to **Peril Strait**, with proper allowance for tides.

**Cape Decision**, the **SW.** entrance point to **Sumner Strait**, is at the same time the **SE.** entrance point of **Chatham Strait**. It is by the recent surveys placed in—

Latitude .....	56° 00' 08" N.
Longitude .....	134° 07' 31" W.

**Cape Ommaney**, the **SW.** extreme of the strait, bears from **Cape Decision** **W.  $\frac{1}{4}$  N.**, distant 22 miles. The recent surveys have materially changed the geographical positions of **Cape Decision** and of **Cape Ommaney**, which is in—

Latitude .....	56° 11' 01" N.
Longitude .....	134° 40' 09" W.

The western shore of **Chatham Strait** will be first taken up in the description. **Baranof** and **Chichagof** islands form this western shore.

**Cape Ommaney** is the extreme **SE.** point of **Baranof Island**. It is described by **Vancouver** as "a very remarkable promontory that terminates in a high, bluff, rocky cliff, with a round, high, rocky

\* The Coast Survey observations of 1888 note but little tidal current in **Frederick Sound**. The pilots navigating these waters note a current of  $1\frac{1}{2}$  to 2 knots to the westward, with the ebb tide between **Cape of the Strait** and **Cape Fanshaw**, and a very strong current from **Cape Fanshaw** to **Point Gardner**.

islet lying close to it." It is a very narrow point of land. The islet near it is called Wooden Island. The height of the cape is estimated at 1,000 feet, and the land **NW.** of it is very high. The cape is conspicuous, and is easily recognized on approaching from seaward.

From Cape Ommaney the general direction of the western shore of the strait is, by the old charts, **N NW.  $\frac{1}{2}$  W.** for 40 miles, when it bends slightly to the westward. Baranof Island is high, the mountain peaks being generally bare of timber. Many of them are never entirely free from snow, and among them are numerous glaciers. The shores are generally steep and bold-to, with many unexplored inlets. The only harbors of which anything is known to navigators being at Port Conclusion, where Vancouver made some surveys in 1794.

**Port Conclusion** is 6 miles above Cape Ommaney; at its entrance it is about  $1\frac{1}{4}$  miles wide, and is nearly 3 miles long in a **N.** and **S.** direction to its head, where it is less than  $\frac{1}{4}$  mile wide. The soundings are deep and somewhat irregular, but there appear to be no outlying dangers. On the east shore of the port,  $\frac{3}{4}$  mile south of the small island which forms the eastern entrance point, is a cove about  $\frac{1}{4}$  mile wide, having a sandy beach at its head and apparently affording an anchorage in about 5 fathoms,  $\frac{1}{8}$  mile off shore; about  $\frac{1}{2}$  mile farther south, on the same shore, is Ship Cove, where Vancouver moored his vessels. This small cove is but 1 cable wide and 2 cables long, with its entrance contracted by some outlying rocks, within which is a depth of 4 or 5 fathoms; it can only be safely used by very small vessels.

On the **W.** side of the port, **W.** from the **E.** entrance point, is a small cove which might afford an anchorage. The shores of Port Conclusion are mostly steep and covered with a dense growth of evergreen timber. The tides probably conform to those usual in that section, being high water, full and change, at about 12 hours after the moon's passage.

**Alexander Bay**, a small basin having a very contracted but clear entrance of less than 1 cable in width, is  $2\frac{1}{2}$  miles to the southward of Port Conclusion. The entrance to this basin, which would not be noticed unless quite close to, lies  $\frac{1}{2}$  mile **SSW.** from a small island which stands about  $\frac{1}{4}$  mile off shore and having some rocks near it. The depth of water in the entrance is about 4 fathoms, on which kelp grows, and within the depth varies from 3 to 8 fathoms. This harbor can only be used by very small vessels.

The northern entrance point to Port Conclusion has been named Point Eliza; it is low, narrow, and rocky, and from it, in a **NNE.** direction, some islets and rocks extend for a short distance, with deep water close to them.

Point Eliza forms also the south point of the narrow entrance to another inland basin called **Port Armstrong**. The opposite point is a small projecting headland, distant from Point Eliza about  $\frac{1}{2}$  mile **N.** by **E.**, this distance being somewhat narrowed by the rocks and islets off that point. The narrow neck forming the entrance to Port Armstrong is nearly  $\frac{1}{2}$  mile long and about  $\frac{1}{8}$  mile in width; the shores of this entrance are steep-to, with not less than 8 fathoms in mid-channel. Within this entrance the expanded basin is about 1 mile long and about 4 cables wide. The soundings are tolerably regular, from 30 fathoms in the middle to 10 fathoms near the shores. Just within the entrance, on each side, are sand beaches and plenty of fresh water. In the vicinity of these beaches is a small extent of low land, but the other parts of the shores are steep, rugged, and heavily timbered. It is probable that the tides run very strong through the narrow entrance to this port, and that in bad weather the williwaws blow with great force down the mountain sides, which should be considered, if intending to make use of this harbor.

The broad entrance to Port Conclusion marks the entrance to Port Armstrong, and no particular directions seem necessary.

From Port Conclusion to Point Thatcher, a distance of about 68 miles, the **W.** shore of Chatham Strait is steep and bold, without outlying dangers. It is indented by many inlets and bays, none of which have been explored in the interest of navigation. Many of these inlets appear to be extensive and with bold shores; at the head of one, opposite Point Gardner, a glacier can be seen coming down nearly to the water. But one of these numerous inlets has as yet been dignified by a name.

**Kelp Bay** (Deep Bay of the early charts) lies about  $5\frac{1}{2}$  miles to the **SE.** of Point Thatcher, and extends several miles in a westerly direction. This bay has not been surveyed, but it is described by Tebienkoff as about 2 miles wide at the entrance. Off the northern entrance point a cluster of rocks project  $\frac{1}{2}$  mile into Chatham Strait. On the southern shore, within the bay, are four islands; the northern shore is much indented. The bay is said to extend inland about 6 miles. From its head is a portage of  $2\frac{1}{2}$  miles to an inlet making to the southeastward from Peril Strait.

From Kelp Bay to Point Thatcher the shore trends in a northwesterly direction, with several coves and a good many outlying rocks, especially off the projecting points between the various indentations.

It is said that several of the inlets on the west side of Chatham Strait connect by high, steep portages with bays or inlets on the west side of Baranof Island.

#### CAPE DECISION TO POINT KINGSMILL.

The eastern shore of Chatham Strait from Cape Decision to Point Kingsmill is formed by Kiui Island, the southern half of which separates Chatham Strait from Sumner Strait. From the cape to

Point Sullivan, about 38 miles, the shore of Kiui Island trends about **NW.  $\frac{1}{2}$  W.**, and is very irregular and much indented by bays and inlets, and there are many islands and rocks lying close along the shore. This coast was examined by Vancouver, by whom the present chart was constructed, but no surveys appear to have been made.

**Point Harris** is 17 miles above Cape Decision. This point is described by Vancouver as remarkable by being a low projecting point on which is a single hill, appearing from many points of view like an island. Along this stretch of coast are many small open bays, and numerous rocks and islets are noted lying along the shores.

**Port Malmsbury**, lying immediately to the **SE.** of Point Harris, is described by Vancouver, but not surveyed. Off Point Harris to the southward is an island and several rocks or rocky islets. The southeastern headland of the port lies from Point Harris **SE.** by **E.  $\frac{1}{2}$  E.** 2 miles; south of this headland is a broad open bay, the southern headland of which is a rocky point projecting from a rocky peninsula.

The course of Port Malmsbury from the entrance is **N.  $\frac{3}{4}$  E.** for 3 miles, when it turns abruptly to the **SE.** for 3 miles farther. The northwestern shores are irregular, and guarded by numerous rocks and islets extending well off shore. There are also some rocks and islets at the extreme head of the bay. The navigable entrance to the inner harbor or port is along the **SE.** shore.

A deep cove exists immediately **NE.** of the **SE.** entrance point. It appears to be clear of obstructions and well sheltered, but no soundings are given.

The entrance to the inner harbor or port is given as about  $\frac{1}{2}$  mile wide. At its inner side is an islet and some rocks. Within the port a comparatively short arm extends to the northwestward, and probably contains an anchorage. Vancouver remarks that the port "was found free and easy of access by keeping near the southern shore, the inner portion of the harbor affording very excellent shelter, with soundings from 17 to 34 and 12 fathoms." An Indian village is situated on the inner harbor of the port.

**Tebienkof Bay.**—From Point Harris, **NW.** by **N.  $\frac{1}{2}$  N.**  $3\frac{1}{2}$  miles, lies the southern headland, not named, of a large open bay, which has been called Tebienkof Bay. This bay is about 9 miles in width at the entrance, the general course of the main stream being about **E NE.** for 7 or 8 miles, when it divides into several ramifications, some of which reach within a very short distance of the eastern shore of Kiui Island. This bay has never been surveyed, and a detailed description of it will not be attempted. Almost the entire bay appears to be occupied by innumerable islets and rocks. There are several Indian villages on the bay.

**Point Ellis** is the northwestern entrance point to Tebienkof Bay. It lies 13 miles **NW.** by **N.** from Point Harris. The point appears to be of ordinary height, with some rocks about it, and forms the southeastern headland of another large inlet or bay, which, from the abundance of rocks and islets within it, has been called the **Bay of Pillars**. Point Sullivan, the northwestern point of entrance to this bay, lies  $7\frac{1}{2}$  miles **NW.** by **N.** from Point Ellis. A portage connects one arm of the bay with Port Camden on the **N.**, and with the northern branch of Tebienkof Bay on the **S.** The whole bay fairly bristles with islets and rocks; those trending to the **SSW.** from the tongue which divides the bay into two arms, extend from 3 to 4 miles from the point, and outside of a line joining the entrance headlands.

Off Point Sullivan, and surrounding it, are numerous islets and rocks for a radius of 1 mile from the point. There is an Indian village on the bay.

From Point Sullivan to Point Kingsmill, a distance of about 14 miles, the shore trends **NW.  $\frac{1}{2}$  N.** About 5 miles above Point Sullivan is a small bight in which is an island and some small islets. Beyond that the shores are steep and bold, rising rapidly back to the high land of Kiui Island.

At Point Kingsmill, which is steep and high, a broad branch of Chatham Strait extends to the northeastward as Frederick Sound,\* the main body of the strait continuing to the northwestward.

**Point Gardner**, lying 10 miles **NW.** by **W.  $\frac{1}{4}$  W.** from Point Kingsmill, is the northern point of separation between Chatham Strait and Frederick Sound. It is the extreme **SW.** point of Admiralty Island. Nearly  $\frac{1}{2}$  mile **S SE.** from the point is a large, flat rock about 20 feet high, having sunken ledges and kelp close-to.

#### POINT GARDNER TO POINT MARSDEN.

From Point Gardner, the eastern shore of Chatham Strait, formed by Admiralty Island, extends in a general **NW.** by **N.** direction for 10 miles to Point Caution. It is uniformly bold, and backed by comparatively high and wooded land, extending into the interior of the island. In this distance the shore forms a long shallow bight, near the middle of which are two small bays, separated by a narrow point, with two small islands near the northern one. There are also some rocks moderately close to shore.

**Point Caution** is a long narrow point of moderate height and wooded, trending in a general **WNW.** direction. It forms the southern point of entrance to a large bay called White Water Bay, where a good anchorage may be found.

\* Described on page 139.



About 1 mile off the point of Point Caution is an extensive detached reef, called **Russian Reef**, which, according to Meade, "is close to the land, and consists of eleven very ugly rocks extending about **NW.** and **SE.** along the land for 2 miles."

**White Water Bay**, with a broad, clear entrance, **N.** of **Russian Reef**, is about 3 miles in extent **E.** by **S.** and **W.** by **N.**, with an average width of about 1 mile.

Extending **NNW.** from Point Caution is a narrow, rocky ledge, partially covered at high water. At its extreme end is a single tree,  $\frac{3}{8}$  mile **WNW.**, from which is a rock showing only at extreme low water.

**Woody Point**, the **N.** entrance point of **White Water Bay**, lies **N.** by **E.**  $\frac{1}{4}$  **E.**  $1\frac{1}{8}$  miles from Point Caution. Off the point a ledge extends to the **WSW.**  $\frac{1}{2}$  **S.** about  $\frac{1}{2}$  mile.

The position of **Russian Reef** is not accurately determined with reference to **White Water Bay**. According to Meade, who has given the only published description of it,\* "if a line were drawn from Point Caution to **Woody Point** the reef would be nearly 1 mile outside of that line." It is probable that the ground is foul between the reef and Point Caution.

Within the bay, **E.** by **S.**  $\frac{1}{4}$  **S.** from the **Lone Tree Rock**  $1\frac{3}{8}$  miles, is a bluff projecting point called **Flag Point**; **NNW.** nearly  $\frac{1}{2}$  mile from this point is **Healy Rock**, a small, black, rocky islet, surrounded by foul ground and kelp for nearly 1 cable distance. A small, black, rocky islet, unnamed, lies  $\frac{3}{4}$  mile **E.** from **Flag Point**, and  $\frac{1}{4}$  mile off the southern shore; it is surrounded by kelp.

On the **N.** shore, nearly  $\frac{1}{2}$  mile from **Woody Point**, is an Indian village, and  $1\frac{1}{8}$  miles inside the point is **Black Point**, with a small rocky islet close-to. About  $\frac{1}{2}$  mile farther in is **Sand Point**, named from its formation, and about the same distance still farther in is **North Island**, low, wooded, and close to shore. East of a line between **North Island** and the unnamed rocky islet, on the opposite shore, the soundings are somewhat irregular, with shoals and numerous kelp patches.

From the southward, **White Water Bay** may be distinguished in summer by the bright green grass plot near the Indian village and the lone tree on the outlying rock off Point Caution. A vessel should not approach the eastern shore of **Chatham Strait** in this vicinity nearer than 2 miles.

The approximate rise and fall of tide in **White Water Bay** is 16 feet, and it is high water, full and change, at about 12<sup>h</sup>.

All heavy winds draw up or down **Chatham Strait**, and hence a secure anchorage is found in this bay.

#### DIRECTIONS FOR WHITE WATER BAY.

With the bay well open stand in on a mid-channel course **E.** by **S.** When in line between **Sand Point** and **Rocky Point**, or **Sand Point** bearing **NNW.**, haul sharp up for **North Island**. On this course, **NE.** by **N.**, a vessel will pass over an 8 to 5 fathom patch of hard ground, and immediately after into deeper water. Anchor in 10 to 14 fathoms, with **Black Point** and **Sand Point** in range. This will be about 400 hundred yards from **North Island**.

**Rocky Point**† lies about 5 miles northwestward of **Woody Point**, with several visible rocks near it, and possibly other dangers not visible. In this vicinity the shore line is very much in error on the charts in present use.

**Rocky Point** is the southern headland of a broad open bay, unnamed. On the **N.** side of this bay, quite close in shore, is a moderate-sized island, near which is a village of the **Neltushkin** Indians.

**Village Point** is the northern headland of the bay, close **E.** of which is a small **L**-shaped inlet extending to the northward and eastward.

**Distant Point**, 2 miles above **Village Point**, is marked by a small islet and one or two visible rocks close in shore. The point is the southern headland of an extensive indentation called **Hood Bay**. In this vicinity white patches, visible through the trees, are croppings of marble and limestone. There are several islands and numerous reefs in this bay.

**Kenasnow Island**, on the **N.** side of the bay, is the largest of the islands. On its **N.** side is an Indian village, and also a large plant for the manufacture of herring oil and guano. The post office at this place has been called **Killisnoo**. A government school for Indians is located here.

**Table Island**, lying close to the **E.** end of **Kenasnow Island**, is low and flat, with a few straggling small trees. There is a narrow but safe passage between these island. **Table Island** is surrounded by ledges, particularly on the western side, all showing more or less kelp.

**Sand Island**, about  $\frac{1}{2}$  mile to the eastward of **Table Island**, is low and sandy; sounding through, heading **SE.** by **S.**, in mid-channel between these islands, 8 fathoms was the least water obtained.

At the head of **Hood Bay** are numerous sunken ledges and reefs. Ledges, visible at low water, project from the eastern end of **Kenasnow Island**, and have been locally marked by beacons. About  $\frac{1}{4}$  mile **ENE.**, approximate, from **Kenasnow Island** is a dangerous rock that covers at  $\frac{1}{4}$  flood. This rock is on a line between **Table Island** and a bold cliff on the shore of the mainland to the **NE.**

\* U. S. Hydrographic Notice, No. 13, 1869.

† This point should not be confounded with the **Rocky Point** which is within **White Water Bay**.

## KOOTZNAHOO INLET.

On the **N.** side of the **E.** end of Kenasnow Island is a substantial wharf. The anchorage is a little to the eastward of the line of the wharf in apparent mid-harbor. This harbor is somewhat contracted, and in heavy **SE.** weather is not particularly desirable on account of the heavy squalls.

The tides run strong, the flood making to the **NW.** around the **E.** point of the island.

There is a good channel on the **N.** side of the island, but it is somewhat contracted by a ledge just to westward of the wharf, and extending across to a point on the opposite shore, forming a rocky bar over which  $4\frac{1}{2}$  fathoms can be carried. The ledge shows kelp on either side, and on the island side has been locally marked by a beacon.

From **Point Samuel**, on the **W.** end of the island, a reef extends nearly  $\frac{1}{2}$  mile to the **NW.**; in the broad bight eastward of the point and reef vessels may anchor in 15 fathoms with good protection in southerly weather.

The **N.** shore of Hood Bay is fringed with kelp-covered ledges; in an angle on the **N.** side, nearly opposite the wharf, is a narrow high-water entrance to a good-sized lagoon.

**Danger Point**, a round, bluff, wooded point, about 500 feet high, off the extremity of which a ledge, mostly visible at low water, extends about 300 yards **W NW.**, forms the **NW.** headland of Hood Bay; about  $\frac{1}{2}$  mile inside the point is a large Indian village called Angoon, and having considerable cultivated ground in the vicinity. A very narrow and low portage at the village connects with Kootznahoo Inlet.

**Kenasnow Rocks.**—Fronting the Indian village of Angoon, and lying about  $\frac{1}{4}$  mile off shore to the southward, is an extensive reef, portions of which are always above water, called Kenasnow Rocks. This reef is something over a mile in length **W.** by **N.** and **E.** by **S.**, and nearly  $\frac{1}{2}$  mile in width. A narrow passage separates its eastern end from the outlying ledges of Admiralty Island at Saginaw Point. Between the western end of the reef and Danger Point is a deep passage  $\frac{1}{4}$  mile wide; between the reef and the village a vessel may find a temporary anchorage in 12 fathoms, close to shore. The passage between Danger Point and Kenasnow Island was named **Kootznahoo Roads** by Meade, and the anchorage was called **Koteosok Harbor**. The whole is now known under the general name of Killisnoo.

## DIRECTIONS FOR HOOD BAY.

**From the Southward.**—Pass to the westward of Table Island, giving it a berth of at least  $\frac{1}{4}$  mile steer mid-channel between it and Kenasnow Island, until up with the beacon on the ledge at the **SE** point of the latter. This ledge shows at low water, with bold water close to its outer end where the beacon is placed. Round this beacon sharp to port at 75 yards distance and slow down. Anchor in 13 fathoms in apparent mid-harbor just to the eastward of the line of the wharf. Lone Rock is the only danger; there is nothing to mark it at high water.

**From the Westward or Northward.**—A vessel may enter on either side of Kenasnow Island; if by the **N.** side give the **W.** end a berth of  $\frac{3}{4}$  mile and follow mid-channel, proceeding with caution over the rocky bar described above, which is abreast the store, and anchor as before.

The tides run strong here, and it is well to anchor with a head tide. According to Meade it is high water, full and change, at the anchorage, at 0<sup>*h*</sup> 20<sup>*m*</sup>, with a rise of 12 feet. Ebb runs 7 hours, flood  $4\frac{1}{2}$  hours, stand  $\frac{1}{2}$  hour.

All the waters in this vicinity should be navigated with caution until the proper surveys are made.

From the entrance to Peril Strait the course to pass in **S.** of Kenasnow Island is **NE.** by **E.**  $\frac{1}{4}$  **E.**, and the distance from Fairway Island to Kenasnow Island about 8 miles.

## KOOTZNAHOO INLET.

On the **N.** side of Danger Point is the narrow entrance to an extensive system of inlets, lagoons, and connecting lakes. This network of inland waters has been in a measure explored, but no proper maps nor accurate descriptions of it are known to exist. Extensive fields of lignite are supposed, from all indications, to exist in this vicinity, and also extensive marble beds. A portion of the inlet has been visited by the U. S. Revenue Steamer *Wyanda* in 1868, and by the U. S. S. *Saginaw* on several occasions in 1868,'69; both were for the purpose of mining coal from veins that crop out, and which are mostly covered at high water.

Commander Meade, commanding the U. S. S. *Saginaw*, constructed a chart from a running survey of that part visited by the *Saginaw*, and this description, necessarily incomplete, is from that and such other information as could be obtained.

**Kootznahoo Head**, the **N.** point of entrance to the inlet, is a high, round, densely wooded, dome-shaped hill, about 800 feet high, forming a low bluff or steep bank near the water's edge. A view is given, on H. O. Chart, No. 225, of the entrance, which is about 4 cables in width. The same chart gives also a sub-sketch from Commander Meade's reconnaissance of Kootznahoo Road and Koteosok Harbor, the latter being the old name of the anchorage off the wharf, now generally known as Killisnoo.

About 1 mile inside the entrance to the inlet are reefs which, with the rush of water through the narrow entrance, cause great tide-rips and overfalls that roar like a huge waterfall; at the full strength of the tide the current is estimated at 10 to 12 knots.

From Meade's sketch and other information it would appear that the general course of the explored part of the inlet is eastward and northeastward for some 3 miles; thence northerly about 6 miles, when it again curves to the eastward for several miles to **Mitchell Bay**, then to the southward for about 2 miles where it expands to the northeastward and terminates in a large bay called **Kanalkoo Bay**. At the point where it turns to the northward is an opening to the northeastward into a large lagoon which swarms with herring during the season; a long, narrow tongue of land separates this lagoon from a broad passage filled with reefs and rocks, and which connects with the northern branch near **Mitchell Bay**. An extensive reef dams the middle of this passage, so that during a portion of the ebb tide the current runs out at either end. The eastern side of the northern channel is a succession of long, low, wooded islands, the navigable channel being to the westward of them.

In mid-channel at the entrance to the inlet the depth is from 10 to 15 fathoms. About 2 miles within the entrance the depth diminishes to 6 and 7 fathoms, and the inlet curves to the northward. On the **SE.** side near the village is a long, narrow, bare rock called **Village Rock**. It is connected with the southern shore by a shoal, where at certain stages of the tide are extensive overfalls.

From **Turn Point**, which is on the northwestern shore  $\frac{1}{2}$  mile northward from **Village Rock**, some rocks extend directly transverse to the channel and nearly two-thirds the distance across it from the point. There appears to be 4 or 5 fathoms in the passage of 1 cable width between these rocks and the **SE.** shore.

Meade anchored at slack high water in this vicinity. He says: "During the last of the flood the ship, though in a tideway of about  $2\frac{1}{2}$  or 3 knots per hour, did not sheer, but as soon as the ebb tide made, the whirlpools commenced and the vessel sheered about so violently that there was great danger of snapping the cable, so got under way with some difficulty." He called the place "**Hell's Acre.**"

**NE.** from **Turn Point** are two open channels with some tide ripples at their common entrance. The easternmost one leads to the herring lagoon before mentioned, while the westernmost one, leading to the northward for several miles, again joins the explored channel nearly opposite **Point Bridge**, inclosing 3 large and several small islands in its course.

The explored channel is separated from the others to the eastward by **Channel Point**, the **S.** point of a large island from which a ledge extends nearly  $\frac{1}{2}$  mile. A mile or so northward from this, in the explored channel, is **Still Water Anchorage**, with a depth from 15 to 20 fathoms;  $1\frac{1}{2}$  miles northward the channel is again obstructed by numerous visible rocks forming strong tide ripples. A small bight on the west side is called **False Channel Bay**, its northern extreme being **Point Pillsbury**. On its south side are three rocky islets, the southern one being called **Deception Island**. An opening to the eastward leads to the channel on the west side of **Channel Point** and previously noted. The navigable channel is through the cluster of rocky islets off **Point Pillsbury**, leaving two of them to the westward; 8 to 10 fathoms are noted in this passage.

From **Point Pillsbury** to **Point Bridge**,  $1\frac{1}{2}$  miles, the channel is straight but very narrow, its western side being more or less foul. There appears to be 6 or 7 fathoms in this channel; two small openings on its eastern side connect with the unexplored channel before noted. There is a small rock off **Point Bridge**, and at this point there are in the strength of the tide very strong rapids, whirlpools, and overfalls. From here the west shore is followed, the channel turning gradually to the eastward; on the eastern and southern shores are numerous islets and rocks; at the **N.** end of **Long Island** are strong rapids. After passing **Hemlock Point** some ledges make out from the northern shore; a mid-channel course appears to carry clear. On the southern side, opposite **North Point**, is a wooded islet, the passages on each side of which are closed by a rocky dam, over which the ebb tide flows, except during the first quarter of its run. To the northeastward the channel expands and is called **Mitchell Bay**. In this vicinity the sandstone formation has been weatherworn in most peculiar and interesting shapes, and many of them most grotesque.

On the western side of **Mitchell Bay** is **Diamond Island**, of moderate size and wooded. At the northern angle of the bay is a stream connecting with a chain of several lakes extending to the northward into the heart of **Admiralty Island**. On its **NE.** side are two small islets called, respectively, **Bare Islet** and **Target Islet**; one of them is wooded. The **SE.** side of the bay is very foul, though most of the dangers show at low water or are marked by kelp. At the **SE.** angle of the bay is **Davis Creek**, so called, near the entrance to which is a small islet called **Passage Islet**; a ledge, partly bare at low water, connects the western shore at **Mine Point** with **Passage Islet** and extends beyond the islet nearly halfway across the channel. In this vicinity a coal mine has been opened, but is not worked. South of **Passage Islet** an opening to the southwestward is known as **Lighter Creek**, near the mouth of which are extensive coal croppings, from which considerable lignite was taken in 1868, '69. These croppings are mostly covered at high water.\*

From **Passage Islet** **Davis Creek**, running **S.**, is about  $1\frac{1}{2}$  miles long and less than  $\frac{1}{2}$  mile wide; in its northern half are some kelp patches, probably marking rocks. About  $\frac{3}{4}$  mile below **Passage**

\* Many fossil plants are found in the slate of this formation.

Islet, on the west shore, is a Big Rock at about high-water mark; a little below this, on the opposite shore, is an extensive ledge extending halfway across the channel and mostly bare at low water. At the south end of Davis Creek is Stone Islet; an extensive ledge connects it with the projecting point to the northeastward. Here the shore turns suddenly to the NE., and Davis Creek is expanded into a large bay called **Kanalkoo Bay**, in which is good anchorage. In the bay are two islands, and in its SE. angle a large mountain stream comes in. In the NE. angle of the bay is a small stream, which is the outlet of a good-sized lake, from which is a portage of 12 hours to Seymour Canal, on the east side of Admiralty Island. On the S. side of Kanalkoo Bay are extensive coal croppings and a deposit of marble; the former is covered at high water. E. of these waters the high land of Admiralty Island rises to a height of 2,000 to 3,000 feet, the mountain tops being nearly always bare of timber.

With the meager information at hand it is not possible to give sailing directions for the navigation of this inlet; it should not be attempted without the aid of local knowledge.

According to Meade, "The tide runs ebb at Mitchell Bay for about 1 hour after it has begun to flood at Kootznahoo Head." He also says that the "ebb runs 7 hours and the flood  $4\frac{1}{2}$  hours, with a stand of  $\frac{1}{2}$  hour."

From Kootznahoo Head to Point Cube, a distance of about 35 miles, the E. coast of Chatham Strait is but little known. From Cube Point northward to its head Chatham Strait is surveyed. In this part of Chatham Strait the depth of water in mid-channel varies from 327 to 388 fathoms, with 50 fathoms to within 200 yards from either shore.

About 9 miles NW.  $\frac{1}{2}$  W. from southern part of Kootznahoo Head, according to the chart, is Point Parker. It is a rather prominent, low point, composed of shingle, of triangular shape, with rocks and a kelp patch close to off its extreme end. Between it and a point about  $2\frac{1}{2}$  miles above Kootznahoo Head, supposed by Meade to be the Point Samuel of Vancouver, the shore line forms a shallow bight, near the middle of which is the outlet of a large lake about 2 miles back from the shore. This outlet is plainly marked in passing by an apparent straight cut through the timber. The coast is in general only moderately high and terminating uniformly in a bold shore free from shoals or other dangers.

In this vicinity Vancouver notes that he found the northerly flood tide only of short duration, the set of the current being usually toward the southeast. This was probably a counter current along the shore, as in mid-channel the flood tide sets regularly to the northward for full 6 hours.

The surface of the country is rugged and heavily timbered with varieties of the pine and cedar. About 8 miles above Point Parker the charts indicate a small bight, off which are some rocks close to shore, surrounded by kelp in 2 to 5 fathoms. The rocks as well as the shore were observed to be of white marble streaked with green and dipping vertically. The shore behind the beach rises to a considerable height, and has received the name of **Marble Bluffs** from the white limestone croppings showing on its face.

About 4 miles above the Marble Bluffs a low point, known as Fishery Point, projects into the strait. This sand point can be well distinguished when abreast Point Parker. Just above Fishery Point is a stream of good size, where many salmon are taken during the season. About  $\frac{1}{4}$  mile off shore, at the mouth of this stream, is a large rocky ledge that is probably nearly or quite covered at high water.

About 9 miles northwestward from Fishery Point the SW. angle of a broad-faced point, called Point Hepburn, projects into the strait, and having near it some rocks. Between these points the shore is more or less indented, and there are inshore rocks indicated in several places.

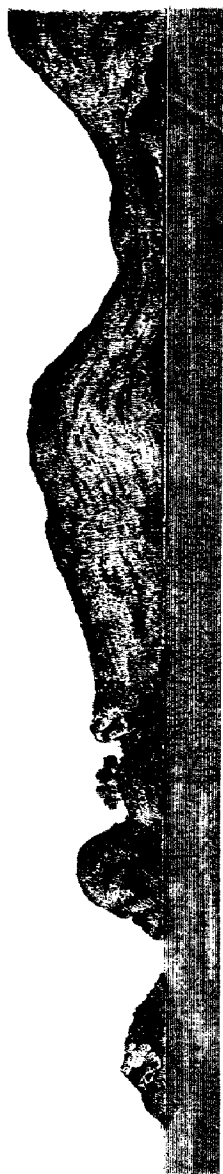
From Point Hepburn the shore trends N NW. for about  $2\frac{1}{2}$  miles to Cube Point, the shore between forming an inconspicuous bight. From the sand at the head of this bight prospectors have washed out a small amount of gold.

Cube Point is narrow, bluff, rocky, and densely wooded above, and extends about  $\frac{1}{4}$  mile in a NW. direction. At its extreme northwestern end is a square bluff mass of rock, connected with the main point by a level strip of dry beach. This point forms the western point of entrance to a snug little anchorage, open to the northwestward, called **Square Cove**. This cove is about 500 yards long NW. and SE., and 270 yards in width. There is a depth of  $2\frac{1}{2}$  fathoms within 1 cable of the fine sand beach at its head, and deeper water farther out. The cove is but little wider at its entrance than at its head. Its sides rise in bluff walls of rock, heavily timbered above. There are no dangers nor obstructions. The broad sand beach at its head is abundantly supplied with driftwood, and a stream comes in at each end of it, the eastern one forming a cascade.

From the eastern extreme of the beach, Cube Point and Point Augusta are in range, bearing W. Square Cove affords good protection from all but northwesterly winds, for a single vessel of moderate size.

In this vicinity it is said that the tides meet, flooding to the northwestward in Chatham Strait, and to the southeastward from Icy Strait. From Square Cove the shore has a direction NW. by W. for 3 miles to a slight projection; here its direction changes to NW. for 2 miles to Point Marsden.

Point Marsden is described as being only moderately high and timbered, with mostly rocky shores. The land in the vicinity is low and well timbered, but free from the usual dense undergrowth of the country.



Pt. Thatcher, S.E. point of Peril Strait S.E.  $3\frac{1}{2}$  Miles.  
(from U.S. Hydrographic Chart No. 225)

The geographical position of Point Marsden is—

Latitude .....	58° 03' 18" N.
Longitude .....	134° 48' 10" W.

Just northward of Point Marsden is a cove known as Game Cove. A stream of considerable size comes in from the southward and eastward through a meadow, which is a noted resort for wild fowl, deer, and other game. There is a mud flat at the mouth of this stream. A few cables northward from it, on the eastern side of the cove, is a rocky platform or assemblage of rocks, disconnected from but close to the beach.

Game Cove has a fine weather anchorage in 20 to 30 fathoms, soft bottom.

About  $1\frac{1}{4}$  miles above Point Marsden a reef, bare at half tide, marked by kelp, extends  $\frac{1}{2}$  cable's length to the northward. Behind this reef is a cove, nearly  $\frac{1}{2}$  mile deep and  $\frac{1}{4}$  mile wide, having a good but contracted anchorage in all winds except from the NW. A low-water ledge lies in the center of the entrance, with a passage each side of it. Anchorage in  $3\frac{1}{2}$  fathoms for small steamers and launches, with good southerly protection. About  $2\frac{1}{2}$  miles above Point Marsden lies the lower point of the entrance to Hawk Inlet.

**Hawk Inlet.**—For a distance of 5 miles from its mouth this inlet has a N NW. direction, and a width of  $\frac{1}{2}$  mile; then it contracts to a width of  $\frac{1}{4}$  mile, and changes direction to N. by E., terminating in a basin of circular form nearly 1 mile in diameter. Five small streams enter this basin, their debris forming mud flats along its shores. Nearly in the middle of this basin is an excellent anchorage in from 6 to 7 fathoms. A trail and portage leads to Youngs Bay, Stephens Passage.

The entrance to Hawk Inlet is narrowed by ledges bare at low water, projecting from the N. entrance point in a southerly direction  $\frac{1}{4}$  mile, fringed with kelp, and at the S. entrance by two small islands, the outer and larger one of which being about 100 yards long in a direction NW. and SE., is  $\frac{1}{4}$  mile from shore. Both islands are at the mouth of a small cove, dry at low water.

About  $\frac{3}{4}$  mile up the inlet on its E. shore two streams enter, forming an extensive mud flat, which at present stretches  $\frac{2}{3}$  of the distance across, leaving, however, a good channel with 7 fathoms between it and the W. shore. Here the tidal currents are strong, causing swirls. The greatest depth found, 45 fathoms, is about 2 miles from the entrance and about 3 miles farther up near the entrance to the basin is the least depth,  $3\frac{1}{2}$  fathoms.

#### SAILING DIRECTIONS FOR HAWK INLET.

The best time to enter is at low water. Enter on a course ENE., and give the two islets at the S. entrance a berth of  $\frac{1}{2}$  mile on the starboard hand, and when the E. end of the southern island is just open of the E. end of the northern island, bearing about S. by E., haul to the northward, and keep on that range until Bare Rock is on the port beam, distant  $\frac{1}{2}$  mile, then head NW.  $\frac{3}{4}$  W. for about  $\frac{1}{4}$  mile, passing about 350 feet from the western shore of the narrows. It is only 350 feet wide in the narrows between the 3-fathom curves and strong tidal currents. After passing the narrows, a mid-channel course can be taken.

Hawk Inlet is about 6 miles long with an average width of  $\frac{3}{4}$  mile, and is much contracted at the head; 5-fathoms water can be taken into Hawk Inlet, with 5 to 45 fathoms inside. The entrance is unsafe, and nothing to be gained by attempting to enter this inlet.

From Hawk Inlet the shore of Admiralty Island extends NW. by W. to Funter Bay, 9 miles distant. The shore is moderately elevated, covered with fine timber, and terminates at the water side, with alternate steep, rocky cliffs and small sandy bays, with a few detached rocks and islets, marked by kelp, lying near it.

Funter Bay is a rather spacious bay, extending 2 miles to the N NW., and  $\frac{3}{4}$  mile wide. The head of the bay expands slightly, forming two bights. In the eastern bight is an island  $\frac{1}{4}$  mile long, in a direction S SE. and N NW. and  $\frac{1}{8}$  mile wide, leaving a small cove on its E. side, called Crab Cove. The western bight is called Coot Cove.\* The latter has a fair anchorage in 10 fathoms, under the W. shore of the bay.

Near the eastern entrance is an island, called Station Island,\*  $\frac{1}{4}$  mile long SE. and NW. and 150 yards wide. At high water this island is divided into two parts. The northern part has an elevation of 76 feet and is wooded; the southern part lies  $\frac{1}{8}$  mile from the E. entrance point, and is 40 feet high. This part was occupied as an astronomical station by Coast and Geodetic Survey in 1890. Its geographical position is—

Latitude .....	58° 13' 37" N.
Longitude .....	134° 54' 52" W.

Rat Island\* is 17 feet high, and is about 30 yards long. A rocky ledge, bare at low water, extends  $\frac{1}{8}$  mile W NW. from it. It lies  $\frac{3}{8}$  mile nearly N. from Station Island, from which it is separated by deep water.

Clear Point\* is the W. entrance point to Funter Bay. About  $\frac{3}{4}$  mile W. from Clear Point are two small islands, the Kittens.\* The outer one is  $\frac{1}{2}$  mile from shore. W NW.  $\frac{1}{2}$  mile from the Kittens is a small dry knoll, called Naked Island,\* which is  $\frac{1}{2}$  mile from shore. About  $\frac{1}{4}$  mile NW. from

\* Named by the U. S. Coast and Geodetic Survey.

Naked Island is North Ledge,\* bare at low water. There is a depth of 18 fathoms between the shore and the islands just described, unavailable, however, as an anchorage.

About  $\frac{3}{8}$  miles **NE.** from Clear Point is Bare Island,\* 30 yards long, with an elevation of 13 feet. There is a clear passage with 17 fathoms between it and the **W.** shore of the bay. About  $\frac{1}{8}$  mile **SSE.** from Bare Island is Curlew Ledge,\* bare at low water; **NNE.**  $\frac{3}{8}$  mile from Bare Island is Gauge Island,\* 100 yards long **NW.** and **SE.**, and 30 yards wide; has an elevation of 72 feet; is wooded. This island is surrounded by rocky ledges, bare at low water, extending mainly in a **SE.** direction over 100 yards.

Star Rock, a small pinnacle, bare at low water, lies 120 yards **N.** from the **N.** end of Gauge Island.

Ledge Island lies  $\frac{1}{4}$  mile **ESE.** from Gauge Island. Ledge Island is low, having an elevation of 5 feet, and is only 50 yards long; rocky ledges, bare at low water, extend over 200 yards **SSE.** from this island.

The depth of water at the entrance to Funter Bay in mid-channel is 48 fathoms, shoaling gradually to 17 fathoms near the anchorage opposite the stamp mill.

#### SAILING DIRECTIONS FOR ENTERING FUNTER BAY.

Being careful to avoid the islands near the entrance, described before, bring the **W.** entrance point, called Clear Point, to bear **NNE.**, distant  $\frac{1}{4}$  mile; then change course to **ENE.** Keep on this course until the first island on your port hand, called Bare Island, being 13 feet high, is abeam; then haul up **NNE.** for the anchorage opposite the stamp mill; anchor in 17 fathoms, soft bottom.

Funter Bay is the best and most accessible anchorage in the vicinity.

Nearly opposite Funter Bay to the **SW.** is Point Couverden. Here Chatham Strait terminates under that name, its continuance to the northwestward being called Lynn Canal.

The west shore of Chatham Strait **NW.** from Point Thatcher will be next reviewed.

Point Thatcher is the north point of Baranof Island, forming also the southern point of entrance into Peril Strait from Chatham Strait. It is 6 miles **NW.** of Lull Point, the **NW.** entrance point of Kelp Bay. The point is a rather broad promontory, from which projects to the **NE.** a reef about  $\frac{1}{4}$  mile broad and 1 mile long, portions of which show at low water; it has been called the Coleman Reef. The point viewed from the **NW.** is of somewhat peculiar shape; it terminates in a bare, skull-shaped knoll, on a neck behind which are a few trees, and in front of the knoll is a pyramidal, rocky islet.

Trader's Island, low and heavily wooded, lies about 1 mile **NW.** of Point Thatcher; to the westward of it are a few small islets and numerous reefs; a channel exists between the island and the point, but it is of no value to navigation and should not be attempted without good local knowledge.

About 1 mile **ENE.** from Trader's Island is the large and dangerous Midway Reef, covered at high water.

Fairway Island, round topped and wooded, lies about  $\frac{1}{2}$  mile **NW.** of Trader's Island. Between these islands are numerous rocks and reefs. The entrance to Peril Strait is on the **N.** side of Fairway Island; it is bold on that side, and may be passed at  $\frac{1}{4}$  mile distance.

Fairway Island is the leading mark for entering Peril Strait; from it the outer end of Morris Reef lies **NNE.**, distant 2 miles.

A **SW.** by **W.** or **NE.** by **E.** course laid to pass  $\frac{1}{2}$  mile north of Fairway Island will carry out or in Peril Strait clear of all known dangers.

Point Hayes, lying **NW.**  $\frac{1}{2}$  **N.** 7 miles from Point Thatcher, is the northern entrance point to Peril Strait; it is a broad, rounded, and rather low point, continuing inland as a high wooded ridge. From the end of the point there is first a ledge of rocks, dry at low water; then a small wooded islet and two bare islets; then a reef of sunken rocks called Morris Reef. About  $\frac{1}{4}$  mile from the wooded islet is a dry rock; the remainder of Morris Reef consists of numerous detached rocks with deep water between them. Some of these rocks are awash at various stages of the tide. The end of the reef is upwards of 1 mile **E.** by **S.** from the small islet and shows considerable kelp.

The reef is now marked by a first-class black can buoy, No. 1. This buoy is moored in 8 fathoms, with 10 to 12 fathoms 50 feet to the **SE.** of it. Inside the buoy the ground is foul; kelp shows at high water  $\frac{1}{4}$  mile **WNW.** of the buoy. From the buoy Point Hayes bears **W.** by **N.**

Always pass to the southward of this buoy; vessels bound to the northward from Peril Strait should not change their course to the northward after passing the buoy until a large white boulder opens from behind a point to the northwestward of Point Hayes, called Peninsular Point.

Vessels bound into Peril Strait from the northward, when 2 miles off shore, abreast the large white boulder, can head for the buoy, and after passing it steer into the strait, heading for Linderberg Head. This large white boulder is 3 miles above Point Hayes.

From Point Hayes to South Passage Point, a distance of 19 miles, the coast extends in a general northwesterly direction, the shores being high and bold, with but one prominent opening. Within 3 or 4 miles of South Passage Point there are several small open bays, but of which nothing is at present known.

\* Named by the U. S. Coast and Geodetic Survey.

About 9 miles above Point Hayes is **Basket Bay**, extending  $1\frac{1}{2}$  miles in a **W.** by **S.** direction and from  $\frac{1}{2}$  to  $\frac{3}{4}$  mile wide. This fine bay affords good anchorage in from 8 to 20 fathoms in mid-channel at from 300 to 500 yards from its head. At the **SE.** entrance point a small reef extends out about 100 yards; there are no dangers at the entrance or in the bay, and the anchorage is well sheltered from both wind and sea. The shores are from 200 to 600 feet high and well wooded, with deep water close-to; at the head of the bay is a sand and shell beach and several native houses. A good-sized stream comes in at the **SW.** corner of the bay from a lake 2 or 3 miles back. From the entrance to **Basket Bay**, **Kenasnow Island** bears **E.** by **S.** No particular directions are necessary for the use of this bay.

**South Passage Point** is the southern entrance point to an extensive inlet, known as **Tenakee Inlet**. Close to the point are two high-water islets.

**Tenakee Inlet** is little known, except by verbal reports.\* It is constantly used by the Indians in their journeys from **Chatham Strait** to **Port Frederick**. It extends about 30 miles in a northwesterly direction to within a few miles of **Port Frederick**, an inlet entering **Chichagof Island** from **Icy Strait**, the two being connected by a portage across a narrow neck of land on the **N.** side of **Tenakee Inlet**, about 2 miles from its head. This portage is about 130 yards long from the high-water marks. The **Port Frederick** side consists of very shallow lagoons or passages for several miles, and from the portage to **Hooniah village** is about 12 miles.

About  $8\frac{1}{2}$  miles within the inlet are the **Hooniah Hot Springs** and a small native village, off which is a small islet. On the **S.** shore are several openings to the southward. These passages are much used by the Indians in their journeys to the more southern part of the archipelago.

**East Point**, about 2 miles **N NW.**  $\frac{1}{2}$  **W.** from **South Passage Point**, is the northern entrance point of **Tenakee Inlet**. It is a low and rather broad point, rising somewhat rapidly to the higher land to the westward; a reef, bare at low water, extends a short distance out from this point.

**North Passage Point** lies about 2 miles **N.**  $\frac{1}{2}$  **E.** from **East Point**. Between these points is the entrance to an inlet called **Freshwater Bay**; this inlet extends to the northwestward about 8 or 10 miles; in its upper portion are some islands, and beyond that fact nothing is known of it.

About 3 miles within **East Point**, on the **S.** shore of **Freshwater Bay**, is **Pavlof Harbor**. In this vicinity the present charts are quite inaccurate, and the duplication of names makes a description somewhat difficult.

**Pavlof Harbor** was sketched by **Meade** in 1869, and published as a sub-sketch on **H. O.** chart, No. 225, under the name of **Freshwater Bay**; this latter name is now applied to the whole inlet. This harbor is about  $\frac{1}{2}$  mile wide at its entrance, and a little more than that in depth; a large stream comes in at its southwestern angle. On the **W.** side of the bay is a small rocky reef called **Pinnacle Rock**, which is covered at extreme high water; the anchorage lies between this reef and the **E.** shore; a reef extends about 1 cable off the eastern entrance (**Meade's East Point**) of the harbor. The anchorage is in about 15 fathoms, with the **W.** point of the harbor (**Meade's West Point**) bearing **W.** by **N.** and **Pinnacle Rock S SW.**  $\frac{1}{4}$  **W.** This harbor is contracted, but is well sheltered, particularly in southerly weather. It is suitable only for moderate-sized vessels.

Between **Pavlof Harbor** and **East Point** are two somewhat contracted coves, both of which afford good anchorage and shelter in southerly weather. The outer cove, called **Wachusett Cove**, was examined in 1881 by **Commander Henry Glass**, U. S. Navy, and a sketch published as **C. S.** chart, No. 734. The second cove, somewhat smaller than **Wachusett Cove**, may be distinguished from it by a small abandoned Indian village on its southern side.

There are extensive sand flats at low water at the head of each of these coves, the anchorage in each being in from 9 to 15 fathoms.

The point on the **N.** side of the second cove is steep-to, and terminates in a cone-shaped hill; and at the bottom of the cove is a round-topped mountain.

No particular directions seem necessary for these anchorages.

**North Passage Point** is long, low, and heavily wooded, appearing somewhat like a glacial moraine; it is about 4 miles above **South Passage Point**; a small reef extends off it to the eastward. On the **N.** side of this point is a broad deep bight, to which the name **Iyoukeen Cove** has been given; in the middle of the bight a reef, partly visible, extends a long way out from shore. On the **S.** side of the cove, well inside the point, an indifferent anchorage in 23 fathoms may be found. A sketch of the cove was made by the U. S. Coast Survey in 1869, and is issued as No. 735 in the series of harbor charts of Alaska.

From **Iyoukeen Cove** to the northward the coast is steep, very high, bold-to, and heavily wooded; 7 miles above the cove is a bight called **False Bay**, affording an indifferent summer anchorage.

**Point Augusta** is 12 miles above **North Passage Point**, and forms the **NE.** extremity of **Chichagof Island**.

From **False Bay** to **Point Augusta** the shores are steep and high. A view of **Point Augusta** is given by **Meade** on **H. O.** chart, No. 225. This view shows the point as a bare, steep, and prominent headland with a peculiar saddle-shaped top. This is in fact a view of a point a couple of miles below

\* Major M. P. Berry, of Sitka, was the first white man to traverse this inlet. Lieut. G. T. Emmons, U. S. N., passed through it in a canoe in 1889.



Point Augusta, and the "Snowy Mountains" of the view is really the true Point Augusta. It is probable that the error was due to misty and foggy weather.

Until proper observations have been made it will be impossible to reconcile the various statements regarding the shores of Chatham Strait in this vicinity, though it would seem, without doubt, that Point Augusta is farther south and west than noted on the present imperfect charts.

Observations made in 1880 by a party from the Coast Survey determined that Cube Point bore east from Point Augusta, "distant 8 or 9 miles." The same party observed Point Augusta as bearing S. 41° 42' W. from a point near Point Marsden, and note the strait as being "about 5 miles wide."

The accepted position of this point near Point Marsden being in

Latitude .....	58° 05' 30" N.
Longitude .....	134° 57' 00" W.,

the geographical position of Point Augusta would be

Latitude .....	58° 04' N.
Longitude .....	135° 06' W.,

or about 2 miles west of its present position on the charts.

At Point Augusta, Chatham Strait has its northern termination under that name; a broad passage continuing to the northwestward under the name of Lynn Canal, and the passage extending to the westward along the north shore of Chichagof Island being called Icy Strait, both of which are separately described hereafter.

## OCEAN COAST.

### CAPE OMMANEY TO PERIL STRAIT.

Cape Ommaney is the **SE.** extreme of Baranof Island. It is a very remarkable promontory, terminating in a high, bluff, rocky cliff, with a round, high, rocky islet lying close to it. It is a very narrow point of land; the islet near it is called Wooden Islet. The cape is about 1,000 feet high; the land **NW.** of it is very high; the cape is conspicuous and is easily recognized when approaching from seaward; the Hazy Islands are also a landmark for the cape.

Cape Ommaney is in

Latitude .....	56° 11' 01" N., approximate.
Longitude .....	134° 40' 09" W.

This determination is that of the late survey, and may be subject to a slight revision when the cape shall be actually occupied for astronomical observations. It changes the position as given on the old charts about 7 miles west (true), and shortens the distance between the cape and Biorka Island, as determined by the U. S. Navy in 1879, by 3 or 4 miles, but makes no great difference in the relative positions of the various parts of the intervening coast.

From the cape the western coast of Baranof Island trends generally about **NW.** by **W.** to Sitka Sound, a distance of about 49 miles. Most of our knowledge of this section is derived from the explorations of the early navigators, and accurate descriptions cannot, therefore, be given until it is reached by the regular survey now in progress.

From the position of Cape Decision, as determined by the survey in 1886, it would appear that Cape Ommaney bears from Cape Decision **W. ¼ N.**, distant 21 miles.

The west shore of Baranof Island is much broken by bays and indentations of variable extent. Its southern part is bold and rocky, rising rapidly from the water and culminating in a short distance in a high mountainous country, very much broken and densely wooded. The interior of the southern part of the island is known only to the few miners who have prospected for precious metals.

There is always a strong tidal current setting around Cape Ommaney, and a moderate wind soon raises a heavy and disagreeable sea.

Bobrovoy Point lies about 2½ miles **W.** by **N.** from Cape Ommaney; it is the **SE.** entrance point to Larch Bay. The coast here is much indented by small coves, and numerous small islets are noted lying close to shore.

Larch Bay is a large open bay about 3½ miles wide at the entrance, and about the same distance in length; the eastern side of this bay is represented as infested with rocks close along the shore, and on none of the charts is it represented as affording an anchorage.

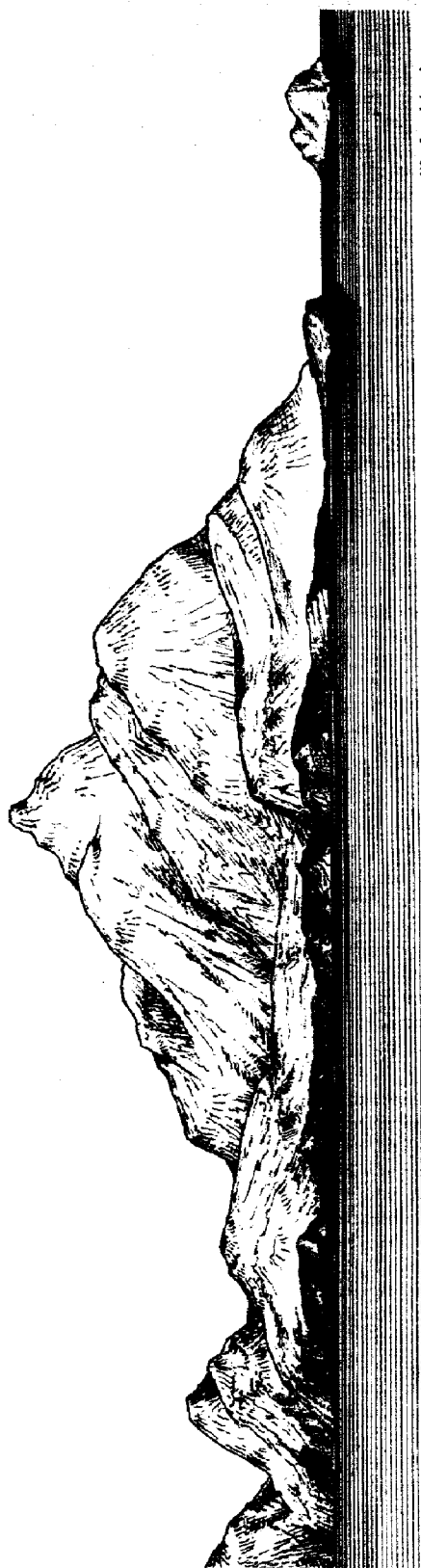
Puffin Point, about 8½ miles above Bobrovoy Point, is the southeastern point of entrance to Puffin Bay. This headland would appear to be a somewhat prominent point extending to the **W SW.**; a small islet and some rocks, probably rocky islets, are noted as lying close to the point; a small islet is also noted off the western entrance to the bay.

Sea Lion Rock is in the entrance to Puffin Bay, about equally distant from both headlands, and outside of a line joining them; it is a bare rocky islet, apparently bold-to; between it and Puffin Point 35 fathoms is noted with variable depths inside the harbor. From the conformation of the bay, as shown on the charts, it would appear to form a good anchorage in all weathers, though doubtless subject to heavy squalls coming down from the high land.



Mt. Edgecumbe

Sitka or Norfolk Sound, Mt. Edgecumbe N W by W  $2\frac{1}{4}$  Miles  
*(from a sketch by Bligh in Cook's Voyages)*



Wooden Island

Cape Ormaney, Alaska, N.N.E. (mag.) 12 Miles

No sailing directions can be given for Puffin Bay more than that it is probably better to enter it to the eastward of Sea Lion Rock.

Nearly 3 miles **NW.** of Sea Lion Rock is an unnamed point, which, with **Red Fish Cape**, 3 miles further to the westward, form the entrance points to an extensive bay; a chain of several islets, known as the **Red Fish Islets**, extends **SE.** nearly 1 mile from the eastern spur of the cape. This extensive bay is formed by three separate bays, bearing different names, but having nearly a common entrance.

The easternmost of these bays is called **Little Branch Bay**; it extends to the **NE.** about  $2\frac{1}{2}$  miles, and is nearly 1 mile in width. Shoals are indicated on its southern shore, and some islets on its **NW.** side. It probably affords an anchorage, but no directions can be given.

The middle bay, called **Big Branch Bay**, extends in a **NNW.** direction nearly 5 miles, and is about  $\frac{1}{2}$  mile in width, expanding somewhat at its head; near the middle of the bay a sunken rock is noted. A long, narrow island, with a small islet close to its **SE.** end, forms the western entrance point to this bay, and at the same time the eastern entrance point to the third bay, called **Red Fish Bay**. No soundings are given, and it is not known that any surveys have ever been made in this locality. From their appearance, as shown on the charts, it is quite probable that all these bays afford anchorages of more or less value. It is probable that they have never been visited except by the small trading and coasting vessels of the Russians.

From **Red Fish Cape** to **Point Lander**, nearly 15 miles, the coast, trending nearly **NW.**, appears to be bold, and shows numerous small bays or coves, of the value of which nothing is known. Three of these have been named, respectively, **Snipe Bay**, about 6 miles above **Red Fish Cape**, **Sandy Bay**, 8 miles, and **Close Bay**,  $9\frac{1}{2}$  miles from the same promontory. These and all other bays opening to the southward are disagreeable from the constant **SW.** swell rolling in from the Pacific Ocean; only when this is broken by a barrier of land can quiet anchorage be found.

Off this coast are three remarkable pillars or pinnacle rocks, called the **First, Second, and Third Kekooors**, lying 4, 5, and 9 miles, respectively, from **Red Fish Cape**, and about  $\frac{1}{2}$  mile off shore.

**Point Lander**, before mentioned, is the **SE.** point of entrance to a large bay whose **NW.** headland, **North Cape**, bears **NW.** by **W.**  $\frac{1}{4}$  **W.** 5 miles from it. Between these headlands is the entrance to **Whale Bay**. This bay was first entered by **Dixon**, in 1787.

**Whale Bay** extends in a general northerly direction about 6 miles, with an average width of more than 3 miles. On its east side are several indentations affording good anchorages, and at its head are two branches, both extending to the northward.

**Point Lander** is represented as surrounded by rocks and islands close-to, and extending to the northward more than 1 mile to the entrance to **Still Harbor**, and about  $\frac{1}{2}$  mile off shore.

**Still Harbor** is about 1 mile long to the **SE.**, and  $\frac{1}{4}$  mile in width. At the head of the harbor is a broad flat with a stream coming in. The anchorage is noted as lying between two small islets near the head of the bay; a large island lies on the **SW.** side not far from shore. The details are unknown, but if of sufficient size, it would appear to be a good and safe harbor, and convenient of access from the sea.

On the eastern shore of **Whale Bay**, about 5 miles above **Still Harbor**, is **Port Banks**, supposed to be the best anchorage in **Whale Bay**. About  $2\frac{1}{2}$  miles **SSW.** from **Port Banks** a rocky islet, some rocks and shoal water are noted about  $\frac{3}{4}$  mile off shore; due caution should be observed in passing. The entrance to **Port Banks** is well marked, though somewhat contracted by an islet lying adjacent to the southern headland, with a still smaller islet inshore of it, and which apparently leaves a passage a little more than  $\frac{1}{4}$  mile wide, and having some 17 fathoms. Inside the port the chart notes 15 and 13 fathoms; the harbor extends nearly 2 miles in a southeasterly direction, and is about  $\frac{3}{4}$  mile wide. **Dixon** anchored in 22 fathoms, muddy bottom, **NW.** one or two cables from a small islet indicated by **Dixon**, though not shown by **Tebienkof**, lying nearly in the middle of the port at its head.

**Port Banks** is completely landlocked; the land to the northward and to the eastward rises above the snow line (June); to the southeastward it is considerably lower, and the whole coast is heavily wooded.

From the north entrance point of **Port Banks** a chain of four islets, said to be connected by reefs at low water, extend to the **E NE.** to the mainland across the mouth of another harbor nearly the same size as **Port Banks**. This bay is represented as about 2 miles long in a **SE.** direction and  $\frac{1}{2}$  mile wide; it is called **Rakovoi Bay**; an anchorage is noted off an extensive flat at the head of the bay. The entrance to the bay is probably between the second and third islets.

North of this bay a wide branch, called **Great Arm**, extends to the northward about 12 miles, with an average width of nearly 2 miles. This arm is probably deep, with precipitous rocky shores.

On the east shore of this arm, about 4 miles **N.** of **Rakovoi Bay**, is a broad shallow cove with an extensive flat at its head, off which an anchorage is noted. About 3 miles above this cove is an inlet extending to the eastward about 2 miles, and less than  $\frac{1}{2}$  mile in width; a stream coming in at the **NE.** angle of this inlet is the outlet of a chain of lakes extending to the eastward. An anchorage is noted at the head of this inlet. **Great Arm** extends 3 miles farther to the northward, and an anchorage is noted at its head, off a mud flat.

On the west shore, 6 miles from the head of the arm, is a small cove where an anchorage is noted. A stream coming into this cove drains a very large lake. The western headland of **Great Arm** is a broad, bold promontory, with a small island close to its southern end. On the west side of this promontory is

off the western shore in the middle of the cove. Symonds Bay was surveyed by officers of the U. S. Navy in 1879, and published as C. S. Chart, No. 724.

#### DIRECTIONS FOR SYMONDS BAY.\*

Clear Hanus Islet by about 200 yards to the westward, avoiding kelp patch which is to the northward of that island, and head for the white sand beach, the center of which will bear about SSE.

Anchor in 7 fathoms water. Avoid the kelp which is on either shore of the harbor.

This anchorage would bring a vessel within less than 200 yards of dangerous rocks. It would appear better for vessels of any size to enter mid-channel and anchor in about 12 fathoms, with Entrance Islet bearing W.  $\frac{1}{2}$  N. and Hanus Islet NNE.  $\frac{1}{2}$  E., which would give a swinging room from the anchor of 380 yards.

Symonds Bay, though small, would make a harbor of refuge for a small vessel that did not care to go in during a southeaster, which would generally be accompanied by mist and rain.

Biorka Island and Symonds Bay have been recommended as points for a lighthouse and fog signal, and a pilot station.

An apparently clear passage nearly 1 mile wide exists on the E. side of Biorka Island, which might be used should a vessel not be able to weather the island to the westward. This passage is called Dangerous Channel; it is doubted if sufficient is known of it to warrant that name.

On the mainland, about 1 mile N. of the island called Yelowoi, one of the Necker group, is a small cove, much obstructed by rocks and islets, called Hot Springs Bay. The anchorage is only safe for steam launches or very small craft.

The chief importance of this locality is derived from the springs, which give it the name. It is much frequented by the Indians and others, resorting thither in cases of rheumatism and skin diseases. The springs have a temperature of 122° Fahr., and the water contains sulphur, chlorine, iron, and manganese. There are no permanent residents, but somewhat rude accommodations are afforded by a few buildings erected by private parties. Communication is had with Sitka by steam launches or canoes. There is considerable meadow land in this vicinity, affording good pasturage for a limited number of cattle. The mountains are high and more or less wooded. Between Hot Springs Bay and Deep Lake is a low and rather narrow valley portage of less than 1 mile.

#### SITKA SOUND.

Biorka Island forms the SE. headland of Sitka Sound, the NW. headland being Cape Edgecumbe, distant W. by N.  $\frac{1}{4}$  N., 13 $\frac{1}{2}$  miles from Point Woodhouse.

This broad expanse of water was the Norfolk Sound of Dixon, but its present name of Sitka Sound is now universally adopted.

From its entrance it extends in a northerly direction about 14 miles, with a width E. and W. of from 7 to 10 miles. The E. and N. shores are fringed with numerous islands and indented by large bays and inlets. The W. shore is more compact, but encumbered with numerous rocks within 1 mile of the shore. The shores are everywhere wooded, rendering it difficult to distinguish from a distance the wooded islets when they are on with the land, which usually rises rapidly from within a short distance of the sea, culminating in broken hills or small mountains, none of which attain a remarkable height. The islands are mostly small, low, and more or less wooded.

The western shore of the sound is formed by Kruzof Island, of which Cape Edgecumbe is the SW. extreme. The cape is bluff near the water's edge, moderately elevated and densely wooded, having the appearance of a table land. On its whole front, including the eastern angle, known as Sitka Point, rocks and breakers extend to seaward from  $\frac{1}{4}$  to  $\frac{3}{4}$  mile. With the flood tide a strong current is said to set close around the point and over the reefs.

Cape Edgecumbe is readily distinguished from any other on the coast by its proximity to the mountain of the same name, which lies about 4 miles NNE. from it.

This mountain is not remarkable for its height, but for its appearance. Its elevation, as measured by Assistant G. Davidson, in 1867, is 2,855 feet. From the sea it appears like a flat-topped mountain, with sides descending at a gentle grade toward the platform at its base. Between the mountain and the sea at Cape Edgecumbe are two smaller knobs.

"From a distance Mount Edgecumbe seems to be the most prominent peak of a small group of mountains, but a careful study reveals the fact that the great volcano of this region has not yet been described, and the peak that has attracted most attention is merely a parasitic cone on the side of a grand old crater, which has not been active for hundreds of years, while the other peaks of the group seem to be remnants of a still greater volcano, whose history would carry us back to the most remote past. \* \* \* This group of elevations appears to rise from a sort of plateau, which is nothing more nor less than the outer surface of the overflows of the greater volcanoes referred to above. The peak now known as Mount Edgecumbe is situated on the southwestern portion of this main mass, and reaches above it nearly 2,000 feet, making the total elevation of the mountain nearly 4,000 feet."†

\* Taken from the notes on the Chart of Symonds Bay.

† From the American Geographical Society's Bulletin, No. 4, 1886.

From the summit of Mount Edgecumbe various deep gorges or ravines radiate, and these are invariably filled or partly filled with snow. Before the winter snows have disappeared these furrows can barely be distinguished. Later in the season the upper part of the mountain is free from snow, except in the furrows, where the white snow makes a remarkable contrast with the red volcanic debris of which the cone is formed. On rare occasions the mountain, as seen in August from Sitka, is entirely free from snow. It is only wooded near the base, as the crumbling volcanic rock near the summit admits of little or no vegetation.

Kruzof Island is about 18 miles long in a **NW.** by **N.** and **SE.** by **S.** direction, with an average width of about 6 miles. It is rugged, but the peaks do not attain any great altitude, Mount Edgecumbe being the highest. The island is rather densely wooded.

Sitka Sound derives its principal importance from the port of Sitka, which is situated on the northern side of the sound. Sitka is the capital and seat of government of the Territory of Alaska, and is the official residence of the governor, the United States district judge, and other officers of the district government. The territorial prison is also located there. An Indian Industrial School and Home, under the control of the Presbyterian Board of Home Missions, is situated there.

From Cape Edgecumbe the eastern shore of Kruzof Island trends nearly **NE.** by **E.** for about 7 miles, with slight irregularities, to a low point, known as Point of Shoals.

Sitka Point, 1 mile **E.** by **N.** from Cape Edgecumbe, forms the eastern angle of the point, of which the cape is the western.

St. Lazaria Island, of small extent, rounded, rather high, wooded, and of the shape of an hour-glass, lies 5 miles **E.** by **N.**, from Cape Edgecumbe, and  $1\frac{1}{4}$  miles off shore.

**Low Islets.**—A small group of low rocky islets, wooded and with some rocks a short distance to the eastward, lie **E NE.** 1 mile distant from the Point of Shoals. The Russian charts indicate a reef connecting the point and the islands, hence in the absence of surveys or local knowledge the passage inside should not be attempted. It may also be mentioned that the flood tide is said to set strongly onto and along this shore from Cape Edgecumbe to the northeastward, which might at times render a vessel's safety in that vicinity somewhat precarious. Three or four small islets lie close to shore, in a broad bight to the **W SW.** of Point of Shoals. The soundings, as given on B. A. Chart, No. 2337, indicate a safe channel between St. Lazaria and Kruzof Island.

About 1 mile **NW.**  $\frac{1}{2}$  **W.** from the Low Islets an anchorage is shown in 8 fathoms, between two projecting points, off which are kelp-covered reefs. From the general configuration of the land it is more than probable that so far as the depth of water is concerned, an anchorage can be found almost anywhere along the **SE.** shore of Kruzof Island.

Vitskari Island, 10 feet high and wooded, with two small islets close to on its eastern side, lies **E.** by **S.**  $\frac{1}{2}$  **S.**  $2\frac{1}{4}$  miles from Low Islets. About  $\frac{1}{2}$  mile to the **NW.** by **W.** from Vitskari is another small islet with a reef extending  $\frac{1}{2}$  mile to the westward, and with reefs lying between the two islands. **N NW.**  $\frac{1}{4}$  **W.** 1 mile from Vitskari is the middle of an extensive partly covered reef about  $\frac{1}{2}$  mile long **E.** and **W.** These reefs all exist, but not always as extensive, nor in the exact position shown on the only available chart now published, B. A. Chart, No. 2437.

In 1880 the U. S. Navy erected on Vitskari Island a conical stone beacon, 20 feet in diameter at the base and 4 feet at the top, from which projects a post 5 feet higher, capped by a large stone which reaches 41 feet above high water, and should be visible from the deck of an ordinary vessel, on a clear day, about 11 miles.

From a point on the highest part of the big Vitskari the following bearings were obtained:

**N.** end of Kulichkof Rock, **E NE.**  $\frac{1}{4}$  **E.**  
 Small Islet, off **NW.** end of Biorka, **S SE.**  
 Southern end of St. Lazaria, **SW.**  $\frac{1}{2}$  **W.**  
 Citadel at Sitka, **NE.**  $\frac{3}{4}$  **N.**  
 Verstovaia Peak, **NE.**  $\frac{1}{2}$  **N.**

Vitskari Island has been recommended as a valuable site for a lighthouse.

From the Point of Shoals the shore of Kruzof Island trends nearly **N.** about  $5\frac{1}{4}$  miles to a very slight projection, known as Monument Point, of no importance, but marked by some rocky pinnacles, which have been called Monument Rocks. About  $1\frac{1}{4}$  miles **S.** of this is a more marked point, called Rocky Point, off which for  $\frac{1}{4}$  mile is a rocky ledge. Another Rocky Point is indicated about  $1\frac{1}{4}$  miles **N.** by **W.** from Monument Point, off which is a group of small islets close to shore.

This latter Rocky Point (Kamenni Point of the Russians) forms the **SW.** headland to a passage leading to the northward, and called by Portlock, Hayward Strait.

Krestof Island at this point forms the northwestern limit of Sitka Sound, and the inland waters extending to the **NW.**, will be taken up later.

Kresta Point,  $1\frac{1}{2}$  miles **NE.** by **N.** from Kamenni Point, is the southern point of Krestof Island, and also forms the **NE.** entrance point to Hayward Strait. This point is formed by a promontory apparently high, rounded, and wooded, with a rocky shore;  $\frac{1}{2}$  mile south of it is Guide Island, high and wooded;  $2\frac{1}{2}$  cables **SE.** from Kresta Point lies a sunken rock, according to the chart, with 9 fathoms between it and the point. Such rocks are usually marked by kelp.



Governor's House

Sitka from the Western Anchorage, 1867.

Indian Village

Valley Mt.

Mt. Nerastovuk



Valley Mt.

Governor's House

Sitka from the Eastward

(From a Photograph in 1860.)

Har

The late surveys in Alaska have noted that many dangers marked on the old charts as sunken rocks are in many cases several feet above the highest high water.

**Promisla Bay** is on the north side of the promontory, of which **Kresta Point** is the extreme. There is an island in the bay, at the bottom of which a depth of 17 fathoms is indicated, and also a passage on each side of the island; just outside the entrance to the bay is a rock 10 feet above high water.

About 2 miles to the N. by E.  $\frac{1}{2}$  E. of **Kresta Point** is **Eastern Point**, bluff and wooded, and forming the SW. headland to **Olga Strait**, leading to the northwestward. To the southeastward of this point are numerous groups of islands; but for present purposes a further description of **Sitka Sound** will be again taken up at its entrance.

North of the **Necker Islands** the east side of **Sitka Sound** is a network of islands and rocks, most of the latter showing at low water, and several bays and deep inlets make into **Baranof Island**. Of the bays little is known, but from the nature of the surrounding waters it is probable that they are more or less encumbered with reefs, and in any event are not of sufficient present importance to warrant the only description that can be given from the present imperfect chart.

**Peisar Island**, somewhat less than 1 mile long NW. by W. and SE. by E., and about  $\frac{1}{4}$  mile wide, lies  $3\frac{3}{4}$  miles NE.  $\frac{1}{2}$  N. from the NW. point of **Biorka Island**; it is low, wooded, and surrounded by rocks and rocky islets;  $\frac{1}{2}$  mile E SE. from its SE. end is a high bare rock, or pillar, called **High Rock Islet**, SE. and NE. of which are several small rocks and islets; 30 fathoms are noted between **High Rock** and **Peisar**.

SW. by W. from the north end of **Peisar Island** is a single small bare rock, not named.

**Cape Burunof** lies about 8 miles N.  $\frac{3}{4}$  E. from the NW. point of **Biorka Island**; it is broad, wooded, and not high, with several islets and many rocks extending to the W SW. nearly  $\frac{1}{2}$  mile; another patch of similar character lies about  $\frac{3}{4}$  mile SW. from the cape; this latter is a small patch and always white with breakers.

About  $1\frac{1}{2}$  miles W SW.  $\frac{1}{4}$  W. from **Cape Burunof**, and  $2\frac{3}{4}$  miles E NE.  $\frac{1}{4}$  E. from **Vitskari beacon**, lies the **Kulichkof Rock**.

To the S. and S SW. of **Cape Burunof** the shores of **Baranof Island** are guarded by numerous rocks and islets of small extent; it does not appear important to refer to these in advance of a survey, except in a general way to those that border on the free water of the sound.

Nearly SSW. about  $1\frac{1}{2}$  miles from **Cape Burunof** lies **Obsechki Islet**, a small knob with 12 fathoms close to it. From this islet in a general SE. by E. direction an irregular chain of rocks and islets extends for several miles. About  $\frac{3}{4}$  mile S. by W.  $\frac{1}{2}$  W. from the islet a rocky patch is located on the Russian charts under the name of **Vasilief Bank**, and  $\frac{1}{2}$  mile SW.  $\frac{3}{4}$  S. from that is another similar patch, both coming under the one name, with a depth of 18 fathoms between, and 20 fathoms to the SE. of the latter patch; both are indicated on the Russian charts as with one dry and two submerged rocks; later investigations indicate that both exist as submerged reefs, though it is probable that portions of each show at low water.

The latter patch is the westernmost of the dangers existing between the **Kulichkof Rock** and **Biorka Island**.\*

From this point the general trend of the chain of islets and rocks is SE. by E.  $\frac{1}{2}$  E. The outermost of these is **Kita** or **Whale Islet**, of small extent, but associated with a large number of smaller rocks, shoal patches, and islets, the whole forming a considerable barrier to navigation in that vicinity.

From **Cape Burunof** the shore is much indented, broken, and guarded by rocks and islets for a distance of  $1\frac{1}{4}$  miles S.  $\frac{3}{4}$  E. to **Poverotnoi Point**, which is comparatively low and wooded. About midway between this point and **Obsechki Islet** is a small islet called **Calming Islet**, closely surrounded by rocks, with a passage of over 20 fathoms depth on either side. One-third mile west from **Poverotnoi Point** is a small, compact group of islets and rocks not named.

Between the point and **Whale Islet** are two small islets, the northwestern one called **First Islet** and the other, close to it, **High Islet**, probably from their position and conformation. A long, narrow island, or rather two small islets with a very narrow passage between, lying  $1\frac{1}{2}$  miles SE. from the point, is called **Crow Island**.

From **Poverotnoi Point** the shores, with a slight indentation, trend S. SE.  $\frac{1}{2}$  E. about 3 miles to an inlet called **Oskerski Bay**,† which at the depth of 1 mile divides into two parallel arms, the southern one narrow and of no present importance. The northern one is about  $\frac{1}{4}$  mile wide and  $1\frac{1}{2}$  miles long, with a depth of not less than 22 fathoms. At its head was situated the **Redoubt** or **Dranishnikof** settlement of the Russians. This was a fortified post to protect the salmon fisheries there located. Through this arm is the outlet of **Deep Lake**, a large, fresh-water lake of large extent, its waters being fed from a large glacier in the mountains to the northeast. The Russian buildings have long since disappeared, and a salmon cannery is now located on the spot. The shores of this arm are bold and rocky, rising on the northern side to a height of 1,500 feet and wooded to the water.

\*There is also a **Vasilief Rock** S. of **Biorka Island**; it should not be confounded with the above.

†Locally known as **Redoubt Bay**.



From the northward the entrance to Osterski Bay lies between Cape Burunof and Kulichkof Rock, passing to the westward of Obsetchki Islet and to the eastward of First and High islets. At this point are numerous islets and rocks, the passage leading between two very small rocky islets and to the westward of the compact group lying south of and close to the point; thence passing east of Crow Island the shore line is followed into the bay. On these lines the soundings show an irregular bottom and a depth of about 10 fathoms.

From the southward or westward it would appear that after passing Biorka Island and to the northward of Peisar Islet and heading to the NE., several passages might exist between the islets leading to the entrance of the bay.

No other directions can safely be given until the locality has been completely surveyed, when it is likely that more or less changes in the charts will be made.

The wind draws very strong through Osterski Bay, and at the best it is properly navigable only by small vessels.

The high peak on the N. side at the Redoubt is known as Mount Dranishnikof, and the high, square, pyramid-shaped mountain  $2\frac{1}{2}$  miles NE. from Poverotnoi Point is called Mount Kinkaid. SW. by S. from Mount Dranishnikof is another pyramid peak called Klinchef. The surrounding country is wooded and much broken.

S. and W. of Osterski Bay are numerous islands and rocky islets; the shores are irregular, and one good-sized bay, called Kanga Bay, lies just south of the southern headland of Osterski Bay.

Hot Springs Bay, already noted, lies 3 miles E SE. from Peisar Island.

Cape Burunof is free from islets on its NW. side, and 10 fathoms may be carried to 1 cable length off shore. One mile due W. from the cape a sunken rock with 4 fathoms on it has been reported. If it exists it is probably a part of the Kulichkof Reef, which lies  $1\frac{1}{2}$  miles W. by S.  $\frac{3}{4}$  S. from the cape.

The Kulichkof Rock is a small compact mass of rock, 20 feet in height above high water, and not awash, as stated on B. A. Chart, No. 2337. The rock is about 200 yards in length, N. and S., and very steep-to. From the highest part of the rock bearings have been taken as follows:

Small Islet off NW. end of Biorka, S.  
 South edge Saint Lazaria Island, SW. by W.  $\frac{1}{2}$  W.  
 North edge Saint Lazaria Island, SW. by W.  $\frac{1}{4}$  W.  
 South edge Big Vitskari, W SW.  
 Citadel at Sitka, N. by E.  $\frac{3}{4}$  E.  
 Mount Verstovaia, N NE.  $\frac{1}{4}$  E.  
 Makhnati Island, West Beacon, N.  $\frac{1}{4}$  E.

About 300 yards N NW.  $\frac{1}{4}$  W. from Kulichkof Rock lies a small patch of rocks awash at high water. The passage between is said to carry  $7\frac{1}{2}$  to 12 fathoms over rocky bottom.

S. by W.  $\frac{3}{4}$  W., a little more than 300 yards distant from Kulichkof Rock, is located another similar but smaller rock. This latter rock, according to the U. S. Navy, bears S.  $\frac{3}{4}$  W. from West Beacon on Makhnati Island.

From Kulichkof Rock the beacon on Vitskari Island bears W SW.  $\frac{1}{2}$  W., distant  $2\frac{1}{2}$  miles. The channel between is, however, but about 2 miles wide, owing to the two small islets close to east of Vitskari on the west side; and on the east side the projection to the westward of the southern Kulichkof and the wash rocks to the NW. of the main Kulichkof.

Midway between Kulichkof and Vitskari soundings in 66 fathoms, mud bottom, have been obtained.

Between Kulichkof and Obsetchki islets are several rocks and breakers, and without local knowledge a vessel should not bring Kulichkof to bear W. of N.

N. by E.  $\frac{1}{4}$  E. from Kulichkof, distant  $\frac{1}{2}$  mile, is a rock awash, or showing a breaker.

A rock, having 12 feet over it and usually marked by a breaker, is said to lie NW. by W.  $1\frac{1}{2}$  miles from Kulichkof and N NE.  $\frac{1}{4}$  E.  $2\frac{1}{8}$  miles from Vitskari beacon. This rock, if it exists, is well to the westward and out of the channel. Repeated inquiries have not confirmed its existence.

The description of islands and rocks thus far given is derived from the observations principally of officers of the U. S. S. *Jamestown* and of the Coast and Geodetic Survey. No surveys have been made, except as noted, but the rocks, breakers, and islands have been examined, and the bearings taken have been sufficient to locate them for the ordinary purposes of navigation.

To the southward and eastward of the Kasiana Islands (described on page (171), the inner or northeast part of Sitka Sound is filled with a myriad of rocks and islets, the largest of which is Japonski Island.

The Apple Islands lie 2 miles west of Japonski. The group consists of numerous rocks and small islets, nearly connected at low water, a few of which are sparsely wooded. Black Rock, S.  $\frac{1}{4}$  E. nearly 1 mile from Apple Islands, is low and showing a few trees; a line of rocks, above water, extends W. by N. from it about  $\frac{1}{4}$  mile.

The Parker Group lie midway between Black Rock and the Apple Islands. The group consists of two or three sparsely wooded islets and is surrounded by ledges.



The **Nevi Islands** lie  $\frac{1}{4}$  mile NE. by E. from the Parker Group. They consist of one large islet and several smaller ones, and some rocks, and are surrounded by ledges, the whole being connected at low water. The largest islet is moderately high and wooded.

**Usher Rock**, bare and closely surrounded by ledges, lies  $\frac{1}{4}$  mile E.  $\frac{1}{4}$  S. from the largest of the Nevi group.

**Sentinel Rock**, high and bare, lies S.  $\frac{1}{2}$  W.  $\frac{1}{2}$  mile from Usher Rock, with some sunken and wash rocks  $\frac{1}{2}$  mile farther to the southward.

**Bare Rock** lies  $\frac{1}{4}$  mile eastward of **Black Rock**.

The rocks and islets just described have been considered as the southern and eastern buttress of the **Kasiana group**.

A line drawn through Usher and Sentinel rocks bounds the western channel to Sitka on the west.

From **Halibut Point**, which is  $2\frac{3}{4}$  miles NW. from the W. end of **Japonski Island**, the shore of **Baranof Island** trends SE.  $\frac{3}{4}$  E. for about  $2\frac{1}{4}$  miles; thence SE. by E.  $\frac{3}{4}$  E. for  $1\frac{1}{4}$  miles to the point at which the wharf at Sitka is located, from which, overlooking the numerous minor indentations, the shore trends about E.  $\frac{1}{2}$  N. for  $2\frac{1}{4}$  miles to the entrance to Silver Bay. Eastward from the northern end of the western channel the space between the various groups of islets and the Baranof shore rapidly diminishes in width N. and S. from  $\frac{1}{2}$  mile at the former locality to less than 1 cable abreast the wharf at Sitka; eastward of this it again widens to its junction with the eastern channel.

The group of islands which protects the anchorages at Sitka is about  $2\frac{1}{2}$  miles long, E. and W., and  $1\frac{1}{2}$  miles broad. It is divided into two nearly equal portions by the Middle Channel, which extends from the sound in a northerly direction, terminating near the western end of the eastern anchorage. The group, is bounded on the E. by the Eastern Channel, and on the W. by the Western Channel.

In the western division of this little archipelago are about 50 islets and rocks, of which the largest forming the southern shore of the western anchorage is **Japonski Island**, nearly 1 mile in length E. by N. and W. by S., and about  $\frac{1}{2}$  mile wide. This island is moderately low and partly wooded; near its eastern end was located the meteorological and physical observatory of the Russians, which has now disappeared.

**Makhnati Island** is the next of importance in this division; it lies about 1 mile S. of the western end of **Japonski Island**, and is the SW. corner of the group. It is the eastern entrance point to the Western Channel, and serves as a landmark for that channel. Upon it, in 1880, was erected a pyramidal wooden mark, rising 72 feet above the water, on the top of the south bluff, and is called the **West Beacon**. The island is 30 feet high and of small extent, with a rocky southerly face of a dark color, with tolerably high spruce trees covering its surface. The height and dark color of the bluff, contrasted with the surf at its base, renders it the most conspicuous of all the islets, often visible when the others are covered with fog, and the first to appear when the fog rolls inland before a westerly breeze.

S.  $2\frac{1}{2}$  cables from the beacon is **Beacon Rock**, with 10 feet of water over it at low water, and showing a breaker in heavy weather.

Between **Makhnati** and **Japonski** islands are a number of wooded islets.

**Signal Island** is NW.  $\frac{1}{2}$  N. about  $\frac{1}{4}$  mile from **Makhnati**; upon it the Russians were accustomed to light a beacon fire for inward-bound vessels. The myriad of islands and the deceptive appearance of the land, from which the islands are not readily distinguished, rendered this of great assistance to the early navigators of the harbor.

From **Signal Island** N.  $\frac{1}{2}$  W.  $\frac{3}{4}$  mile is **Battery Island**, forming the turning point to the western anchorage. It was formerly occupied by an earthwork, now obliterated. It is about  $1\frac{3}{8}$  miles W.  $\frac{1}{4}$  S. from Sitka wharf.

**Channel Rock**, NE.  $\frac{1}{4}$  E., 830 yards distant from the middle of **Battery Island**, lies nearly in mid-channel between the W. end of **Japonski Island** and a point of the mainland of **Baranof Island** N. by W. from it. The rock is of small extent and uncovers about 5 feet at low water; a shoal having less than 18 feet on it extends 210 yards N. from the rock, and is about 200 yards wide. The rock is now marked by an iron spindle, surmounted by a barrel painted black and white; the rock may be passed on either side, but vessels usually use the channel to the southward.

Vessels should not approach the **Japonski Island** shore nearer than 200 yards. The channel N. of **Channel Rock** is about 200 yards wide between the 18-foot curves, and has a depth of  $8\frac{1}{2}$  fathoms.

N. and NE. of **Signal Island** is a compact group of islets and rocks called the **Sasedni Group**; between this group and the western part of **Japonski Island**, and opening into the Western Channel, is a clear space  $\frac{1}{2}$  mile long E. and W. and half as broad, with from 5 to 13 fathoms of water, which is called **Whiting Harbor**; the bottom is uneven, but the holding ground is said to be good, and the anchorage especially protected against northeasterly gales. No directions other than the chart (C. S., No. 725) appear to be necessary; it is very seldom used.

**Passage Islands**, on the SE. point of the western division of the archipelago, mark the western entrance point of the Middle Channel. It is a low, wooded, compact group of six islets and numerous rocks, about  $\frac{1}{4}$  mile in extent E. and W. From them the citadel at Sitka bears N.  $\frac{1}{4}$  E., distant  $1\frac{1}{2}$  miles; shoal water and kelp extend about 1 cable to the NW. of the group.

About  $\frac{1}{4}$  mile **W.** from the Passage Islands are Surf Rocks, low, bare, and surf washed. A clear passage on each side of the rocks connects with Middle Channel. About  $\frac{3}{8}$  mile **N NE.**  $\frac{1}{8}$  **E.** from the largest Surf Rock lies Keene Rock, with 14 feet of water over it at lowest tides.

**Keene Rock** is described as consisting of a patch about 75 yards long **SE.** by **S.** and **NW.** by **W.**, and having at the northern end several pinnacle heads clustered together in a small space with 16 feet over them at low water, falling away at 20 yards distance to 7 fathoms, steep-to, and having at the southern end a pinnacle with 14 feet over it. In summer it is sometimes marked by kelp.

#### DIRECTIONS FOR AVOIDING KEENE ROCK.

For vessels drawing less than 12 feet this rock does not constitute a serious danger in entering the Middle Channel by the old passage between Surf Rocks and Makhnati Island. Larger vessels would do well not to attempt this passage, but should enter directly between Passage Islands and the Kayak Islets.

**By the old passage.**—Round Surf Rock and bring it to bear astern **SW.**  $\frac{5}{8}$  **S.**, steering **NE.**  $\frac{5}{8}$  **N.**, which course carries in clear of dangers to the eastern anchorage, passing close to the northward of the Mitchell Rocks, having 7 and 11 feet over them, respectively, at low water, and which are now marked by a third-class nun buoy painted red.

Turning Island, small, and nearly bare of trees, is of interest only as being the northeasternmost of the western division of the Sitka Group, and being also the turning point to the westward from the Middle Channel to the inner harbor.

**Volga Island** lies  $\frac{3}{8}$  mile **SSW.**  $\frac{1}{4}$  **W.** from Turning Island, on the **W.** side of the Middle Channel, and **WSW.**  $\frac{1}{2}$  **W.** from Mitchell Rocks buoy. The distance between the buoy and Volga Island is 400 yards, which distance is considerably lessened by a narrow shoal extending **NE.** by **E.**  $\frac{1}{4}$  **E.** 200 yards from the island, and having 18 feet at its extremity.

The narrow passage constituting the inner harbor between Japonski Island and the mainland to the northward is obstructed by Harbor Rock, showing 3 feet at low water. It lies  $\frac{3}{8}$  mile **WNW.**  $\frac{1}{4}$  **W.** from Sitka Wharf, and 110 yards off the northern shore. A flat, rocky shoal with from 10 to 15 feet at low water extends from the rock to the Japonski Island shore;  $3\frac{1}{2}$  fathoms may be carried midway between the rock and the mainland to the northward, in a channel about 100 yards in width. The rock is now marked by a spindle surmounted by a barrel painted white.

**Indian Rock**, with 3 feet over it at low water, lies on the range between Harbor Rock and the outer end of Sitka Wharf, and is 175 yards from the latter.

Small vessels may anchor between Harbor Rock and the wharf; permanent moorings have been laid down abreast the **E.** end of Japonski Island for the small man-of-war stationed in Alaska.

There are many other islets and rocks in the western division of the Sitka Group, but as they have no influence on the navigation of these waters it does not seem necessary to particularly describe them. They are all low and grassy, with more or less scraggy timber; there are no ship channels among them beyond those noted.

The eastern division of the Sitka Group is sometimes called the Galankin Group, and lies to the eastward of the Middle Channel, between it and the Eastern Channel. The largest of the group is Galankin Island, nearly  $\frac{3}{4}$  mile long **WNW.** and **E. SE.**; its western end is  $\frac{3}{4}$  mile **SE.**  $\frac{1}{4}$  **E.** from Sitka Wharf. The island is about  $\frac{3}{8}$  mile wide, rather low, and wooded. The next in size in this group are Bamdoroshni and Whale islands, moderate in height, irregular in form, and wooded.

The Kayak Islets are a narrow compact group of small, partly wooded islets extending  $\frac{1}{4}$  mile in a **NW.** and **SE.** direction, and form the southwestern corner of the Galankin Group. The entrance to the Middle Channel lies between this group and the Passage Islands to the westward.

The southeastern side of the Galankin Group has several outlying dangers.

**Simpson Rock**, having 17 feet over it at lowest water, lies 600 yards **E.**  $\frac{1}{2}$  **N.** from the easternmost Kayak Island; from the rock the middle of Whale Island bears **N.** by **W.**  $\frac{1}{2}$  **W.**

**Tsaritza Rock**, having 8 feet over it at low water, lies  $\frac{5}{8}$  mile **NE.**  $\frac{1}{2}$  **E.** from Simpson Rock; from it the **E.** end of Galankin Island bears **N.**  $\frac{3}{4}$  **W.**, distant 500 yards.

Two small rocky islets, called The Twins, form the northeast extreme of the Galankin Group; due **E.** from them, distant  $\frac{1}{2}$  mile, is a small rocky patch, having 4 fathoms least water, and generally showing some kelp.

**Rose Rock** is on the western side of the Galankin Group, abreast Volga Island of the Japonski Group, nearly awash at high water, and the Mitchell Rocks, with 7 to 11 feet over them, and usually showing kelp. These latter rocks are marked close-to on their western side by a third-class nun buoy painted red, which should be left to the eastward in entering. On account of the shoal off Volga Island it is necessary to pass close-to on the western side of the Mitchell Rocks buoy.

There are other small islands and rocks in the Galankin Group besides those noted, but as they have no particular influence on the navigation of these waters it does not seem necessary to particularly describe them. They do not differ in general appearance from those of the Japonski Group.

On the eastern side of the Galankin Group is the broad Eastern Channel, southeastward of which, between it and the shores of the mainland, are several islands and groups of islands, and one some-

what dangerous rock called **Zenobia Rock**. It lies **S SE.  $\frac{3}{4}$  E.** from the West Beacon, distant  $2\frac{1}{8}$  miles, and **SW.  $\frac{1}{2}$  S.** from the East Beacon, distant  $1\frac{1}{2}$  miles. It has 15 feet over it at low water, and from its position is dangerous only to sailing vessels beating into or out of the Eastern Channel.

On the eastern side of the channel, northward from Point Burunof, the islets form three principal groups. The largest island is **Dolgoi or Long Island**; it is the nearest to Point Burunof. It is about  $\frac{3}{4}$  mile long **NE. by E.** and **SW. by W.**, and is quite narrow. Mertz Island lies in a bight on its **N.** side; inside this latter islet is a convenient and safe boat anchorage in about 2 fathoms.

**NW. by N.  $\frac{1}{2}$  mile** distant from Dolgoi Island are the **Belknap Islands**, two in number—**The Eckholms**, a small compact group of several islets and rocks, and **Liar Rock**, the whole comprised within a space of  $\frac{1}{2}$  mile long **E. and W.** and less than  $\frac{1}{2}$  mile wide. They will be referred to only as **The Eckholms**.

This group is at the southern point of entrance to the Eastern Channel. On the middle Eckholm, East Beacon has been erected by the U. S. Navy, and is a pyramidal, wooden structure, similar to the West Beacon, and rises to 72 feet above water.

**NE. by E.  $\frac{1}{2}$  E.** about 1 mile from **The Eckholms** is the **Kutchuma Group**, comprising six or more islands and islets with some reefs, but no outlying dangers.

About 400 yards to the northward of Fasset Islet, the northeastern of the **Kutchumas**, is a projection of the main shore, bluff, narrow, and steep-to, called **Silver Point**; immediately **NE.** of the point and close to shore is the small **Cobb Islet**, just **E.** of which is a small cove affording anchorage for small craft.

From Point Burunof to the eastward the shore trends about **E NE.**, steep and irregular, with islets and outlying rocks not far off shore for about 2 miles to Sandy Cove, an indentation about  $\frac{1}{2}$  mile in extent. This cove contains several rocks and islets. Just **E.** of the cove is Deep Inlet, extending in an easterly direction about  $3\frac{1}{2}$  miles between high mountains. The entrance is very narrow, with a small islet on its southern side, and carries 17 fathoms least water, deepening to more than 45 fathoms inside, where the inlet is about  $\frac{1}{2}$  mile in width; at its head a sounding of 27 fathoms is shown. About  $\frac{1}{4}$  mile outside the entrance a sunken rock is noted.

**The Gull Rocks** lie  $\frac{1}{4}$  mile off shore, about  $\frac{1}{2}$  mile **W.** of Sandy Cove.

**Dolgoi Island** lies **W.  $\frac{3}{4}$  S.  $1\frac{1}{2}$  miles** from the entrance to Deep Inlet.

Between the northern headland of Deep Inlet and Silver Point is a broad entrance to an inlet, called **Alentkina Bay**. The **Kutchuma Islets** lie close off the mouth of this bay. A large island and several small ones lie close to the **N.** side of this bay, which, **S.** and **E.** of the large island, extends to the northward and eastward about 2 miles. The bay is about  $\frac{1}{2}$  mile wide, with soundings from 20 to 10 fathoms. Neither this bay, Deep Inlet, nor Sandy Cove afford any present advantages to navigation.

About  $1\frac{1}{2}$  miles **N.** from Silver Point is a projection of the Baranof, or main shore, with several wooded islands close to it. Westward of this the shore recedes to form a cove about  $\frac{1}{2}$  mile in extent, called **Jamestown Bay**, in which are some rocks, but where a convenient watering place is found. The western head of the bay is marked by Cannon Island, connected at low water with the mainland. Jamestown Bay is open to the southward, and offers shelter only to small craft behind the islands. It has from 14 to 5 fathoms of water.

The islands on the **E.** side of Jamestown Bay on the **N.** and Silver Point on the **S.** form the entrance points to a broad bay, terminating on its northern side in a deep, broad inlet, called **Silver Bay**, and on its southeastern point in two smaller inlets, the southern one being called **Camp Kogan Bay**.

The headlands of Silver Bay are not named. At its entrance it is about  $\frac{1}{2}$  mile wide, and extends in a northern direction for about  $\frac{3}{4}$  mile, whence it trends nearly **E.** for nearly 4 miles to its head, with an average width of a little more than  $\frac{1}{2}$  mile. At its head, and on the **N.** shore, it receives the waters of several large streams. Salmon Bay and Bear Bay are two small coves on the northern shore, and 1 mile within the entrance a large stream comes in, which afforded power for a sawmill. At the head of the bay is an extensive waterfall, and on the **S.** side a small islet.

The mountains rise on either shore nearly 2,000 feet, and are heavily wooded. The shores are steep with deep water close-to. In the middle of the entrance a sounding of 72 fathoms is given. At the time of the Russian survey the soundings indicate a contracted anchorage in 10 fathoms inside the small islet at the head of the bay. A large shallow stream enters there, and the soundings may now be much reduced.

From Bear Bay a wagon road has been built to the Lucky Chance mine, about 1 mile up the mountain from the head of the bay. Several glaciers exist in the mountains near the mines.

**No Thoroughfare Bay**, on the **S.** side of the **SE.** headland of Silver Bay, is a small narrow inlet, extending about  $1\frac{1}{2}$  miles to the westward, and consisting of two basins connected by a narrow boat passage. The entrance is choked by several islets, and it is of no value to navigation. Immediately southward and adjacent to this bay is another narrow inlet, called **Camp Kogan Bay**. It extends in an **E NE.** direction about  $1\frac{1}{2}$  miles from the entrance, which is on the **S.** side of a high round-topped islet, and is about  $\frac{1}{2}$  cable in width, but widening out to nearly 2 cables for its entire length. Several

streams come in at its head, and an extensive flat makes out about  $\frac{1}{4}$  mile. Good anchorage may be had here in 10 fathoms, muddy bottom, about  $\frac{2}{3}$  the distance in from the entrance islet. It is perfectly sheltered, but it is probable that during winter gales the williwaws come down from the surrounding highland with great force. Narrow boat passages connect near its entrance with No Thoroughfare Bay. There are no dangers in the bay and no particular directions are necessary.

**Silver Bay**, and also the two bays just mentioned, freeze over during the winter, but they do not remain closed for any length of time.

From Jamestown Bay westward to Sitka wharf are extensive flats, projecting out nearly  $\frac{1}{4}$  mile, with deep water close-to. About  $\frac{1}{4}$  mile W. of Cannon Island is Garden Point, just N. of which a large stream, called Indian River, comes in from the northward through a somewhat extensive valley. The stream is fed by the melting glaciers in the mountains. Back of Sitka the land is high and densely wooded. On the E. side of Indian River Valley is a marked peak, called Mount Verstovaia, 3,216 feet high. It is sharp, rugged, and bare at the top. Cross Mountain, 2,600 feet high, is a lower peak of the same mountain. Mount Verstovaia is a valuable landmark, when visible, in entering the harbor of Sitka.

From Garden Point to Sitka wharf the shore recedes to the northward, forming a large bight nearly  $\frac{1}{4}$  mile deep. Near the middle of the bottom of this bight are situated the prominent buildings of the Indian Mission and Industrial School. In the western part of the bight are several rocky islets connected with the shore at low water.

The **Eastern Anchorage** is in the space between the Mission buildings and the northern entrance to the Middle Channel.

There being no docking facilities of any description in Alaska, vessels whose hulls require repairs must be beached. The following notes are from a report by Lieutenant-Commander Newell, U. S. Navy, on the subject. The location selected by him in beaching the U. S. S. *Pinta*, in 1888, was between the two largest rocky islets just E. of Sitka village:

"The beach is of gray sand and clay, yielding slightly at the surface, but having a firm substratum. All interfering stones above low-water mark have been removed. The beach has a regular slope of about 1 foot in 50. Rise and fall of tide is about 10 feet. The outlying rocks afford protection from the sea, except when the wind is near ESE., and they also afford convenient places for making fast all necessary lines, except those on the starboard bow.

At low tide the limits of the berth are clearly marked, but some of the rocks are covered at high water. It would probably be found advisable to stake these before using the beach.

Standing in from the eastward the following range will lead clear of all obstructions to the middle of the berth, viz: Small chimney on a one-story white house, small wharf in rear, and right-hand side of fire-bell tower (WNW., p. c. about)."

Near Sitka wharf, on a large prominent rock, considerably elevated above the town, stands "The Castle," or citadel of the Russians, and which was the residence of the Russian governor. It is now nearly in ruins. It is easily identified, and is visible from a long distance to the southward.

The town of Sitka is built along the shores between the Mission buildings and the citadel. To the westward of that, facing Japonski Island, is a large Indian village. A large lake, called Swan Lake, lies about  $\frac{1}{4}$  mile to the NW. of the town. Sitka is now the seat of government of Alaska, and the principal government officers reside there.

The **Middle Anchorage**, between the Indian village and Japonski Island, is suitable only for small vessels. The holding ground is not very good and vessels should moor.

The **Western Anchorage** is in the space to the eastward of Channel Rock. This is a good anchorage, but not very convenient, owing to its distance from the landing.

During the winter months NE. gales sometimes sweep across the eastern and middle anchorages with great fury and render them rather unsafe. In southerly gales the sea is considerably felt in both the eastern and western anchorages.

During the Russian occupation heavy moorings were laid down in the middle anchorage, and it was customary during the winter months to moor all vessels there head and stern.

Tebienkof states that "When at the anchorage at Sitka, if the wind blows ENE., and no breakers are visible on Vitskari and Kulichkof Rocks, that the wind outside will be found to come from the SE. or NE., but probably the latter. On the other hand, if the surf be visible on these reefs, when the wind at the anchorage is ENE. the wind outside and within the sound as far easterly as Vitskari will be found to proceed from the S. or W., and it is not advisable for a sailing vessel to attempt to go to sea."

In spring and summer when easterly winds prevail outside they are nearly always found to blow NW. inside the sound.

The westerly winds afford the approaching navigator a view of the land by clearing away the fog, and assist him to the anchorage, while the SE. winds, which bring rain and fog, place no obstacle in the way of his standing off shore.

In entering the sound with a NW. wind the navigator should keep well to the southward, especially before noon; until that time, in most cases, Mount Edgecumbe cuts off all winds from the N. and NW.

from an area extending 1 mile or so **SE.** of St. Lazaria Island. Later in the day, according to Tebienkoff, this is not the case. The same authority also states that "In entering the sound with the wind in the southern quadrants of the compass it will usually veer to **E.** or **E NE.** as the navigator approaches the land."

In the space between Biorka and Vitskari islands a more or less heavy swell is nearly always experienced, even when the water is smooth in other parts of the sound. It has been called "The Rolling Ground."

The tides in this vicinity flood to the **N.** and **W.**, according to the configuration of the land. During the flood the current is said to set strongly upon the reefs and shoals in the vicinity of Cape Edgecumbe; hence that headland should be avoided.

The sound itself presents no great difficulties to navigation up to the barrier of islets which form the protection to the anchorages of Sitka. There are no regular local pilots for the sound.

Near the middle of the parade ground at Sitka an astronomical station was established by the Coast Survey in 1867 in

Latitude.....	57° 02' 51'' .8 N.
Longitude (in arc) .....	135° 19' 45'' . W.
Longitude (in time) .....	9 <sup>h</sup> 01 <sup>m</sup> 19 <sup>s</sup> . W.

and in 1881 the variation of the compass was determined on Japonski Island to be 29° 11' **E.** The landmarks especially identifying the parade ground station have disappeared.

#### TIDES.

The tides at Sitka are compound, and are quite unequal in height and range, consisting generally of two high and two low waters per day, and bear a marked similarity to the type of tides which, with but few exceptions, prevails from San Francisco northward. They differ from those of Bering Sea in the more pronounced character of the smaller low waters.

At Sitka wharf it is high water, full and change, at 0<sup>h</sup> 25<sup>m</sup>, with a mean rise and fall of 9 feet, the extreme rise and fall being 10 feet. The direction of the tidal current past the wharf appears to be very irregular, and not altogether influenced by the wind. Usually the first of the flood runs to the westward, sometimes attaining a velocity of 2 knots, then follows a period of slack, followed by an easterly current, but no positive rule for this can be given.

#### DIRECTIONS FOR SITKA HARBOR AND APPROACHES.

In approaching Sitka Sound from sea the principal landmark is Mount Edgecumbe, which cannot be mistaken. Vessels from Chatham Strait bound to Sitka by way of Peril Strait often find themselves at Salisbury Sound at a time when coming darkness or other causes make the navigation of Neva and Olga Straits undesirable, in which case the excellent anchorage at Schulze Cove is available, or the outside passage to the westward of Kruszof Island may be taken to Sitka.

In the latter case, after rounding the Krugloi Islands  $\frac{1}{2}$  mile to the southward, a course **SW.**  $\frac{1}{4}$  **W.** through Salisbury Sound until Sinits Island bears **SE.**; thence a **SW.** course will carry clear and pass  $\frac{1}{4}$  mile **NW.** of Morskoi Rock. When this rock bears **E.** in line with Siouchi Point, a **SSE.** course carries clear down the coast at not less than 2 $\frac{1}{2}$  miles off shore, where there are no known dangers.

Round Cape Edgecumbe at not less than 1 mile distant, as rocks and breakers make out nearly two-thirds that distance. With Sitka Point bearing **N NW.**, distant 1 mile, steer **NE.** by **E.**  $\frac{1}{4}$  **E.** to pass  $\frac{1}{2}$  mile to the southward of St. Lazaria Island, which has no outlying dangers. In clear weather Vitskari Beacon and Mount Verstovaia should be visible. On a clear night the profile of the mountains back of Sitka can be plainly distinguished.

When St. Lazaria Island bears **NW.**, distant  $\frac{1}{2}$  mile, a course **NE.**  $\frac{1}{4}$  **E.** leads in between Kulichkof Rock and Vitskari Island, passing the latter  $\frac{1}{2}$  mile to the southeastward. The long reef indicated on B. A. Chart, No. 2337, as stretching **NE.** by **E.** from Vitskari Island has no existence in fact.

When Vitskari Beacon bears **NW.** by **W.**  $\frac{1}{2}$  **W.**,  $\frac{1}{2}$  mile distant, a course **NE.**  $\frac{1}{4}$  **N.** for 5 miles leads clear of all dangers to the **S.** entrance of Middle Channel, passing about  $\frac{3}{4}$  mile to the northwestward of Zenobia Rock, and about  $\frac{1}{2}$  mile to the northward of the rock noted on B. A. Charts as lying 300 yards to the northwestward of Kulichkof.

If entering by the Western Channel, a course **N NE.**  $\frac{1}{4}$  **N.** for 4 $\frac{1}{2}$  miles from the position off Vitskari Island will lead clear of all dangers to the entrance of that channel, passing nearly  $\frac{1}{2}$  mile to the southeastward of the (possible) 12-foot rock previously described.

From the same point the entrance to the Eastern Channel bears **NE.**  $\frac{1}{4}$  **N.**, distant 4 $\frac{1}{2}$  miles.

Entering from seaward, Vitskari Beacon, 41 feet high above the water, is prominent on the low Vitskari Island, and should be visible about 11 miles from the deck of an ordinary vessel. Except Biorka Reef, 1 $\frac{1}{2}$  miles **W SW.** from Biorka Island, there are no dangers in entering Sitka Sound. Steer for the beacon and bring it to bear **NW.**, distant  $\frac{1}{2}$  mile, and proceed as above.

Entering from the southward, it is usual to pass to the eastward of Biorka Reef, rounding Biorka Island at a distance of about  $\frac{1}{4}$  mile, or about midway between the reef and the island. When the

## HAYWARD STRAIT.

NW. point of the island bears E. by N., distant  $\frac{3}{4}$  mile, a course N.  $\frac{1}{2}$  W. for  $7\frac{1}{2}$  miles leads clear to a point in line between Vitskari Beacon and Kulichkof Rock, and 1 mile distant from the latter, bearing about ENE. From this point a course N. by E.  $3\frac{1}{2}$  miles leads to the entrance to the Western Channel. A course NNE.  $\frac{3}{4}$  E.  $3\frac{1}{4}$  miles leads to the entrance to the Middle Channel, and a course NE.  $\frac{1}{2}$  N.  $3\frac{1}{2}$  miles leads to the Eastern Channel entrance.

## BY THE WESTERN CHANNEL.

When in mid-channel between Sentinel Rock and West Beacon, a course N.  $\frac{3}{4}$  W. leads in clear. When the N. side of Japouski Island opens to the northward of Battery Island, round that island; pass to the southward of Channel Rock beacon, and anchor in mid-channel in about 8 fathoms, with Sentinel Rock in range with the W. end of Japouski Island.

## BY THE MIDDLE CHANNEL.

The distance between the Passage Islands and Kayak Islets is 450 yards. When midway between these groups steer N. on the range of Volga Island and the citadel, which is prominent as elevated over all the other buildings. When Rose Rock and Rockwell Island are in range, a course NNE.  $\frac{1}{2}$  E. leads in clear to the eastern anchorage, passing close to the westward of the red nun buoy marking Mitchell Rocks.

Directly abreast the Middle Channel the swell from outside renders the berth a little uneasy in southerly weather, and anchorage should be selected accordingly.

## BY THE EASTERN CHANNEL.

With the E. beacon bearing SE., distant a short  $\frac{1}{2}$  mile, steer a course NE. by E. to clear Simpson and Tsaritza rocks. When Katz Island is open to the eastward of Galankin Island, a N. by E. course carries in clear, and when the citadel bears W. by N. head for it and anchor at discretion.

In going to the wharf vessels should not go to the northward of the line of its face. On the E. side are some sunken rocks just inside that range, and on the W. side is Indian Rock.

In passing Harbor Rock vessels drawing 12 feet or more should pass to the northward of the rock, when it shows 1 foot or more above the surface. The bottom is plainly visible on the S. side of the rock through the clear water of the passage.

## INLAND PASSAGES.

## SITKA SOUND TO CHATHAM STRAIT.

Sitka Sound is connected with the waters to the northward of Kruzof Island by a series of passages, some of which are not navigable.

Hayward Strait is on the W. side of Krestof Island, its entrance being between Kamenoi and Kresta points, as previously described. Near the middle of the entrance is Unasatal Island, high and wooded. About  $1\frac{1}{2}$  miles beyond this island the strait is contracted by opposite projecting points to less than  $\frac{1}{2}$  mile, with some intermediate islands along the shores, and immediately expands again in two arms trending, respectively, to the N. and to the WSW. around Magoun Island, and including several smaller islands lying close to its southern side.

One mile inside the western arm is Port Krestof, where anchorage in 6 to 10 fathoms may be obtained. This harbor was used by the Russians when Old Sitka was inhabited, and was surveyed by them, this description being taken from the Russian chart.

At high water Magoun Island is divided into nine or ten islets, with very narrow passages between. The passage by the S. end of Magoun Island is narrow. It has not less than 6 fathoms, and shows no dangers. The passage by the N. side of the island is also narrow, with not less than 16 fathoms, and no dangers shown in the channel. From the entrance point of the western arm shoal water and boulders, bare at low water, extend to the NNW. nearly halfway across the channel.

About  $\frac{1}{2}$  mile inside the entrance point to the northern channel is the very narrow entrance to a large inlet, extending into Krestof Island; 4 fathoms appears to be the least water in the contracted entrance to this lagoon.

Passing Magoun Island the channel opens into a broad expanse of water nearly 4 miles long NW. by N. and SE. by S., and  $2\frac{1}{2}$  miles wide, in which are several islands. At its NW. angle is a narrow passage leading to the NW. and dry at low water for a distance of about 2 miles, then deeper water to Salisbury Sound. At its northern angle this broad sheet of water connects with the well-known Olga and Neva straits.

Since the clear and navigable Olga Strait is well known and more conveniently situated for commerce this passage W. of Krestof Island offers no inducements for navigation.

A reconnaissance of the passages from Sitka to Chatham Strait, as used by steamers and small sailing vessels, was made by the U. S. Navy\* in 1884, and published as Coast Survey Chart 727. From that the present description and sailing directions have been taken.

For the purposes of this work the description of the inland passages from Sitka to Chatham Strait will be made as general as possible. In the sailing directions the salient points and features of the passages will be noted.

The various anchorages off Sitka have been already noted with the description of that harbor, and the following general outlines will begin at the Kasiana Islets, a group of one large and numerous small islets to the westward of and close to it; the larger islet lies  $1\frac{1}{2}$  miles NW. by W.  $\frac{1}{2}$  W. from the W. end of Japonski Island. This group is moderately high and the larger islet is densely wooded; large kelp patches between this group and the Apple Islands, to the southward, indicate foul ground, and there are also numerous small islets in that space. SW. of this group, and S. of Middle Island, is filled with a great number of small islets and rocks and foul ground mostly marked by kelp.

W. NW.  $\frac{1}{2}$  mile from the largest of the Kasiana Group is Middle Island,  $1\frac{1}{2}$  miles in length, with Crow Island very close to it on the SW. side; Middle Island is high and wooded.

N.  $\frac{1}{2}$  W. from Middle Island are the Gavanski Islands, Big Gavanski being 1 mile from Middle Island, with several islets lying between.

About 2 miles NW. by W. from the N. end of Big Gavanski is Eastern Point of Krestof Island, this space being nearly filled by several large islands called the Siginaka Islands.

These various groups of islands form the western side of the passage from Sitka to Olga Strait, and separate it from the northwestern part of Sitka Sound. The eastern shore of this passage is formed by Baranof Island.

From Sitka the Baranof Island shore trends in a general NW. by W. direction to Halibut Point, which lies  $2\frac{1}{2}$  miles NW. from the W. end of Japonski Island. A little less than  $\frac{1}{2}$  mile below the point is a small high-water islet, off which a ledge extends a short distance.

Halibut Point is low, sandy, and wooded, rising rapidly to the high land to the NE. About  $\frac{1}{2}$  mile to the N. by W. from the point a rocky reef makes out nearly  $\frac{1}{2}$  mile.

Harbor Point is  $1\frac{1}{2}$  miles N.  $\frac{1}{2}$  W. from Halibut Point; between these points, and nearly  $\frac{1}{2}$  mile off shore, is a cluster of small wooded islets and rocks called Old Sitka Rocks; the outermost one, which at high water is just awash, bears from Halibut Point NW., distant  $\frac{1}{2}$  mile, and from Lisianski Point S.  $\frac{1}{4}$  E.,  $1\frac{1}{2}$  miles.

N. by W. from Harbor Point is Old Sitka Harbor, where formerly stood the town of Sitka, or Fort Archangel Gabriel, which was destroyed by the Indians in 1802. A few native houses and gardens now mark the place. The waters in this vicinity, between Lisianski Point and Old Sitka Rocks, was called by the Russians the Bay of Starri-Gavan.† Off Old Sitka is a fair anchorage ground, rather close to the shore, in from 15 to 30 fathoms. It is said that the westerly winds do not blow home, but during their prevalence a large swell rolls in. No particular directions beyond the chart seem necessary.

N.  $\frac{1}{2}$  W. from Harbor Point is the entrance to Katliana Bay, a little more than  $\frac{1}{2}$  mile wide and extending to the NE. about 3 miles. The waters of this bay are deep. A broad cove on its NW. side contains several islands and a somewhat contracted anchorage in 7 to 9 fathoms on the S. side of the islands; this cove is well protected except from the williwaws that sweep down from the high land.

Lisianski Point, high, bold, and heavily timbered, forms the NW. headland of Katliana Bay; it is the extreme southern point of a peninsula of the same name, and lies  $2\frac{1}{2}$  miles N. by W.  $\frac{1}{2}$  W. from Halibut Point, and nearly  $\frac{1}{2}$  miles N. NE.  $\frac{1}{2}$  E. from the N. point of Big Gavanski Island.

About  $1\frac{1}{2}$  miles NW. by W. from Lisianski Point is a bluff timbered point, called Dog Point, forming the S. entrance point to Nakwasina Passage, Point Krugloi forming the northern entrance point; this entrance is nearly closed by Crosswise Island, high and wooded, and by the smaller Beehive Island, so named from its characteristic appearance. The navigable entrance E. of Crosswise Island is narrow, but appears to be clear of dangers.

Point Krugloi lies nearly  $\frac{1}{2}$  mile N.  $\frac{1}{2}$  E. from Eastern Point of Krestof Island, the two forming the entrance points to Olga Strait, which, at  $\frac{1}{2}$  mile above the latter point, narrows to 400 yards, and, running in a general NW. by W.  $\frac{1}{2}$  W. direction, retains about that width for  $2\frac{1}{2}$  miles to Creek Point, where it bends slightly to the westward, but immediately regains its original direction, widening gradually to 900 yards in width to a point on the eastern shore  $\frac{1}{2}$  mile above Creek Point, where it is joined by the northern entrance to Nakwasina Passage, which is here about  $\frac{1}{2}$  mile wide.

In Olga Strait are several small projecting flats that cover at high water; these flats are the debris from mountain streams and extend out less than 100 yards. A small grassy clearing a short distance above Point Krugloi marks the site of an old native village.

About  $1\frac{1}{2}$  miles above the narrow entrance to Olga Strait is a kelp patch extending entirely across the strait with a sand flat on the western shore. In a careful examination of this patch not less than 7 fathoms was found; in the strength of the tide most of the kelp runs under. Near Creek Point

\* Commander J. B. Coghlan and officers of the U. S. S. *Adams*.

† Large or Great Bay.



there is kelp on either shore, but not less than 9 fathoms was found in the channel. The shores of Olga Strait are high and heavily wooded.

**Nakwasina Passage** is of considerable extent. It was not included in the survey by Commander Coghlan, but from an examination made by the Coast Survey in 1869 we know that it, with Olga Strait, incloses a large island called Halleck Island. This island is about 4 miles long **NW.** and **SE.**, and of about the same breadth. It is nearly triangular in shape, moderately high, irregular, and wooded; the northwestern part is low and flat.

From the narrow southern entrance the passage broadens and extends to the northward nearly 5 miles; on the **E.** side are two large coves. In the southern one are several islands, and one small island in the northern one. There are shallow flats at the head of each cove and probably an anchorage, if necessary.

The **NE.** point of Halleck Island lies about 4 miles about **N.** from Point Krugloi; at this point the passage turns abruptly to the westward, and at 1 mile **WNW.** from the point is very narrow and the navigation is impeded if not entirely obstructed at low water by a bar. On the **N.** side of this narrow passage are extensive deposits of marble, but of so broken a character as to have no commercial value.

This narrow passage is about 2 miles long and then turns abruptly to the southward, widening to nearly 1 mile, and extending for about 2 miles, when it joins the waters at the **NW.** end of Olga Strait. In this part of the passage are several islands, and off the **S.** entrance point of a cove on its western shore a sunken rock is reported. A kelp patch, about 100 feet in diameter, lies **WNW.** of the northern entrance point of Olga Strait, a little more than  $\frac{1}{2}$  mile off shore.

**Olga Point**, the **NW.** extreme of Krestof Island, is the western point of the northern end of Olga Strait. It is  $1\frac{1}{4}$  miles **W.** by **N.**  $\frac{1}{4}$  **N.** from Creek Point.

West of Olga Point and Krestof Island is the broad expanse of water described previously, and which connects with Sitka Sound through Hayward Strait. The entrance leading to it is  $\frac{3}{4}$  mile wide; it is obstructed by two islands and a rock with a passage on its **NW.** side about 500 yards in width. This rock lies a little more than  $\frac{3}{8}$  mile **W.** by **S.**  $\frac{3}{4}$  **S.** from Olga Point. It covers or is awash at high water, but is sufficiently out of the channel not to impede navigation.

Between Olga Point and the large island **W.** of it an indifferent anchorage may be obtained, for which no directions seem necessary.

From the northern end of Olga Strait the channel turns to **W.** for about 1 mile to the southern end of another narrow passage called Neva Strait.

**Neva Point**, lying **W.** by **N.**  $\frac{3}{8}$  mile from Olga Point, is the eastern entrance point to Neva Strait. Northeast of the point and close to is a good sized cove but no anchorage. A rocky ledge extends **S.** from Neva Point about 100 yards.

On the **W.** shore **W SW.**  $\frac{1}{4}$  **S.** from Neva Point is a small but very distinct high-water island which is a leading mark in crossing from Olga Strait.

In Neva Strait, nearly in mid-channel,  $\frac{3}{8}$  mile from above Neva Point, is Whitestone Rock, a broad, flat rock whitish in color, and about 3 feet high above high water.

**Whitestone Point** is on the eastern shore of the strait a little less than  $\frac{3}{4}$  mile above Neva Point; between these points a narrow rocky ledge showing kelp fringes the shore, and the passage **E.** of Whitestone Rock is but a little more than 100 yards in width and is called **Whitestone Narrows**.

For  $\frac{1}{2}$  mile beyond White Rock the navigation is tortuous and much obstructed by rocks and reefs; the reefs are marked by kelp, and some rocky heads show at low water. At nearly high water the kelp is usually run under by the tidal current.

On the **NE.** side of Whitestone Point is a shallow bight showing considerable kelp; the channel runs across the mouth of this bight.

The survey of 1884 denotes a very narrow but nearly straight channel through the rocks in Whitestone Narrows after passing to the eastward of Whitestone Rock; the least water shown is  $4\frac{1}{2}$  fathoms. This channel would, however, be dangerous unless closely buoyed.

The eastern edge of the rocks in the narrows runs **N NW.**  $\frac{3}{8}$  **W.** from Whitestone Rock, the farthest one to the northward being 350 yards **N.** by **W.**  $\frac{3}{8}$  **W.** from Whitestone Point. The least water shown in this passage to the eastward of the reef is 6 fathoms.

About 800 yards above Whitestone Point a good-sized stream comes in on the east shore, off which a sand-spit, dry at low water, projects 200 yards or nearly to mid-channel. This flat or spit is steep-to.

A black third-class nun buoy has been placed to mark the rock last described. This buoy bears **NW.** by **W.** from Whitestone Point. It is near the edge of the kelp and is about 70 feet **NW.** of the rock, over which are 7 feet at low water.

A red first-class spar buoy has been placed to mark the sand spit; it is about 100 feet **SE.** of the end of the spit. From this buoy the mouth of the creek bears **N.**  $\frac{1}{2}$  **E.**

These buoys are usually examined every season, but the strong eddies and currents in the narrows sometimes cause them to shift their position or carry them away entirely.

At low water the kelp and shore line are good leading marks for the navigation of the narrows and of Neva Strait.



Above Whitestone Narrows Neva Strait is but 300 yards in width, broadening a little at  $\frac{3}{4}$  mile above the narrows; but the navigable channel is much narrower, owing to a line of rocks and reefs extending along the middle portion of the strait.

The waters of Neva Strait are comparatively shallow, averaging from 6 to 10 fathoms; the navigation is, however, very direct, and all dangers below water are marked by kelp. If necessary a vessel may anchor in the clear reach above the Whitestone Narrows; the tidal current there is only of moderate strength.

In Neva Strait, on the western shore,  $\frac{3}{4}$  mile above the sand-spit, is a small, low, bare, rocky islet, with ledges which are covered at high water, extending 250 yards to the NW. and half that distance to the SE. of it. This rock is 100 yards off shore and has deep water close to on the channel side.

From abreast this rock the eastern shore nearly to mid-channel is lined with rocks and reefs for the distance of 1 mile; the northernmost rock is bare at all times, and all of them show at low water and are more or less marked by heavy kelp, the channel being midway between the kelp and the western shore.

Abreast the northernmost rock of this line of reefs is a slight projecting point off the western shore, with a shallow flat extending out about 50 yards. On the eastern shore,  $\frac{3}{4}$  mile above this point, is a small, wooded, high-water islet, with kelp patches NW. and SE. from it. About 200 yards SW. by W.  $\frac{1}{2}$  W. from the islet is a kelp patch marking a rock having but 15 feet on it at low water. The channel is between the rock and the islet.

A little more than  $\frac{1}{2}$  mile NW. of the high-water islet is Point Zeal, low and heavily wooded. Close to its head, with a boat passage between, is Entrance Island, also wooded.

Point Zeal is the southern entrance point of a good-sized bay, called St. John Baptist Bay, which being  $\frac{3}{4}$  mile wide at the entrance extends E. into Baranof Island for 2 miles, nearly half that distance at a width of  $\frac{1}{2}$  mile, and the remainder being less than 400 yards wide. At 1 mile inside the entrance a broad stream comes in on the N. shore. It is mostly dry at low water, and has a small high-water islet at its mouth. The SE. angle of the broad part of the bay includes several small islets and considerable foul ground.

The anchorage is about  $\frac{1}{4}$  mile inside the narrow inner arm of the bay.

The head of the inner arm should not be approached nearer than  $\frac{3}{4}$  mile on account of shoals and a flat, extending out quite  $\frac{3}{4}$  mile. A good-sized stream comes in at the head of the arm. On the N. shore of this arm, just inside the entrance, is a rocky ledge, extending out about 100 yards.

#### DIRECTIONS FOR ST. JOHN BAPTIST BAY.

Open the bay well and steer for the middle of the entrance to the narrow arm; anchor in mid-channel, in 15 to 16 fathoms, with the S. point of the inner arm in range with Entrance Island, W SW.  $\frac{1}{4}$  W. This bay is not particularly recommended beyond its use as a temporary stopping place.

The winds here are very irregular, coming in heavy gusts from different gulches, and vessels are constantly swinging. Westerly winds blow home. With northerly winds the gusts are so strong that a large-sized vessel would be forced to moor to get out sufficient chain to prevent dragging.

At  $\frac{3}{4}$  mile beyond Point Zeal, Neva Strait is about 700 yards in width; thence, bending slightly to the westward, broadens gradually to 1  $\frac{3}{4}$  miles wide at Hayward Point.

Kane Islets, nearly in mid-channel, 2  $\frac{1}{4}$  miles above Point Zeal, consist of two moderate-sized, low, wooded islets and a number of very small rocks to the southward of and close to them, with considerable kelp. Between Kane Islets and the W. shore is much foul ground and no safe channel.

On the E. shore, just before reaching the Kane Islets, is a cove about 400 yards in extent at high water, but which is nearly all dry at low water. A rock showing kelp lies in the middle of the entrance. Beyond this cove several small islets are scattered along the eastern shore, about 200 yards from high-water mark.

SW. by W. from Kane Islets a narrow inlet, with a small islet at its entrance, extends to the SE. into Partofs-Chikof Island. This inlet has not been surveyed, but is of no importance. The island mentioned forms the western shore of Neva Strait.

Scraggy Island, low, and named from its appearance, lies 1  $\frac{1}{2}$  miles W.  $\frac{3}{4}$  N. from Kane Islets. There is a small islet midway between Scraggy Islet and the western shore, and it is probable that more or less foul ground exists in that vicinity.

SW.  $\frac{1}{4}$  W.  $\frac{3}{4}$  mile from Scraggy Island is Point Hayward, the NW. point of Partofs-Chikof Island, and the eastern entrance point to the narrow Suokoi Inlet, previously noted on page 180, and sometimes erroneously called Hayward Strait. This inlet is about 3  $\frac{1}{2}$  miles long and  $\frac{1}{4}$  mile wide, connecting by a passage, dry at low water, with the broad expanse of water W. of Krestof Island. The inlet is clear in mid-channel, with a depth from 41 fathoms at its entrance to 6 fathoms at its head.

On the northern shore, 1  $\frac{3}{4}$  miles N.  $\frac{1}{4}$  W. from Scraggy Island, is Point Kakul, high and steep, with rocky ledges and kelp extending about 350 yards off shore. To the SE. of it are two rocky points with extending ledges, and about 1  $\frac{3}{4}$  miles to the SE., on the northern shore, is a large landslide, and the shore is closely fringed with rocky ledges.

## SALISBURY SOUND.

At Scraggy Island, Neva Strait ceases under that name. The broad channel to the westward to the ocean being called Salisbury Sound, and the narrower channel continuing to the northward being known as Peril Strait.

## SALISBURY SOUND.

This expanse of water separates Chichagof Island on the NW. from Kruzof Island on the SE. At the ocean, at its entrance, it is about 4 miles in width, and is about 5 miles in length ENE. and WSW., branching at its inner end into Peril Strait to the N. and Neva Strait to the SE. Its shores are steep and irregular, rising rapidly to high peaks, those on the N. shore being mostly bare. The sound was not included in the survey by Commander Coghlan.

Cape Georgiana, Siouchi Point of the Russians, is the SW. entrance point of Salisbury Sound. This cape is sharp, narrow, rather high, and wooded. Its approximate position as taken from the Russian chart is in

Latitude.....	57° 18' N.
Longitude.....	135° 45' W.

A mile W. of the cape lies Morskoi, or Sea Rock, awash at high water, and always showing a breaker. Soundings show 17 fathoms close to the rock, 27 fathoms in mid-channel, and 23 fathoms close to the cape.

The southern shore of Salisbury Sound is mostly bold-to, with a few visible bordering rocks. About 2 miles NE. from Cape Georgiana is the entrance to Kalanina Bay, extending about 1 mile ESE. into Kruzof Island, and about  $\frac{1}{2}$  mile wide, with a narrow head bending to the southward. On the eastern side of the bay is a wooded mountain 1,500 feet high, rising very abruptly from the water. The depth of water at the entrance is not given, but about the middle of the outer harbor Tebienkoffs' map indicates an anchorage in 15 fathoms, and in the inner harbor are 7 to 3 fathoms. In the extreme inner harbor a small vessel would probably find good shelter, but the ocean swell that is nearly always rolling into the sound would, doubtless, render the greater portion of the bay an uneasy berth. The NE. entrance point of Kalanina Bay has foul ground, extending out about 200 yards.

Half a mile ENE. from Kalanina Bay is Sinitsin Island, about  $\frac{1}{2}$  mile long N. and S., and less than  $\frac{1}{4}$  mile in width. It is low and sparsely wooded, and lies about  $\frac{1}{2}$  mile off shore, with foul ground between. A rocky ledge, showing kelp, extends about  $\frac{1}{4}$  mile to the NW. from the island, with deep water close-to.

To the eastward of Sinitsin Island the shore forms a broad bight, heading in a low valley, on the W. side of which appears the high eastern mountain of Kalanina Bay, and on the E. a wooded hill about 600 feet high. Two rocks are noted as showing in the entrance of this bight. No explorations have been made in this vicinity, and it is possible that a bay exists here affording shelter from westerly winds and seas.

From Sinitsin Island the point forming the NW. entrance point to Soukoi Inlet bears E. by N., distant about  $1\frac{1}{4}$  miles.

There is a small island near the middle of the entrance to Soukoi inlet, the channel being on the E. side of it.

Klokachef Island forms the NW. entrance point to Salisbury Sound. According to B. A. Chart, 2337, which is compiled from Russian authorities, the SW. point of the island bears NW.  $\frac{3}{4}$  N. from Cape Georgiana, distant 4 miles; but an examination of that vicinity by Commander Coghlan in 1884 gives such an entirely different shape to the island that it is more than probable that this bearing is not accurate, though the distance is about correct.

According to Commander Coghlan, Klokachef Island is  $1\frac{1}{2}$  miles long E. and W., its greatest breadth being  $\frac{3}{4}$  mile. Off its western end are two small islets, and from the outer one a reef extends W. nearly  $\frac{1}{2}$  mile, upon which the sea always breaks. S. of the extreme eastern end and close-to are three small islets, and a kelp patch is at the end of the island. Klokachef Island is high, particularly on its eastern end, falling away to the westward, and is densely wooded.

Fortuna Strait separates Klokachef Island from the mainland of Chichagof Island. The entrance to the strait at the E. end of Klokachef Island is  $\frac{1}{4}$  mile wide, but is reduced to half that distance by kelp patches on either shore. There is a passage out to the westward on the N. side of the island, but it is foul and should not be attempted.

Leo Anchorage.—N. of Klokachef Island, in the angle of Fortuna Strait, a bight extends to the northward into Chichagof Island about  $\frac{3}{4}$  mile and about the same width at the entrance; it affords a snug though contracted anchorage.

No particular directions are necessary for Leo Anchorage; enter in mid-channel E. of Klokachef Island anchor in the middle of the cove in 17 to 18 fathoms.

From Klokachef Island the N. shore of Salisbury Sound trends about E. by N. for about 4 miles to Krugloi Islands, where it turns to the NNE., forming the western shore of Peril Strait. This coast is irregular and rocky, with numerous islets lying close along the shore, and one, Goloi Islet, about  $\frac{1}{2}$  mile off shore; there are several deep bights, which an examination may show to contain anchorages.

The land to the northward and westward is high and rugged, with some low valleys between the mountains; most of the peaks are bare of timber. This shore should be approached with care, as the appearance indicates the probability of foul ground.

The waters of Salisbury Sound are deep and entirely free from dangers, except along the shores; an approximately mid-channel course may be boldly taken. The channel between Sinitsin Island on the S. and Goloi Islet on the N. is but little more than 1 mile in width.

## PERIL STRAIT.

At its entrance between Krugloi Island and Point Kakul, Peril Strait is about  $\frac{3}{4}$  mile wide, though this width is reduced to about  $\frac{1}{2}$  mile by the outlying ledges off the point. For the next 8 miles the navigation is the most dangerous of any in Southeastern Alaska, except Kootznahoo Inlet, owing to the strong tides and sunken rocks that obstruct this passage.

Both shores of Peril Strait are irregular and steep, with deep indentations, many of which contain good and safe anchorages; there are numerous islands and rocky islets in the passage, most of which, with the shores, are wooded to the water's edge.

On the eastern shore  $\frac{1}{2}$  mile N. of Point Kakul, is a projecting point, 200 yards N. of which is a group of rocky islets, called the Channel Islets; from the northward and eastward these islets appear to stand much farther out into the channel. From this point the shore turns to the eastward  $\frac{3}{4}$  mile to Range Point; the deep bight between the points affords only a boat anchorage. Ledges project a short distance off Range Point, and 200 yards N. of the point is a small islet.

On the western shore Suloia Point bears N.  $\frac{3}{4}$  E. from Range Point; a deep bight SW. of the point does not afford an anchorage.

At the Channel Islands the channel is but  $\frac{1}{8}$  mile wide, and in the strength of the tidal current there are many and strong whirls.

A rocky ledge projects from Suloia Point about 100 yards.

About  $1\frac{3}{8}$  miles N. by E.  $\frac{1}{2}$  E. from Range Point is Fish Point, low, flat, and wooded; these two points form the entrance points to the extensive sheet of water to the eastward from Peril Strait, nearly 5 miles, called Rubia or Fish Bay. On the N. side of Fish Bay,  $\frac{3}{4}$  miles E. by N. from Fish Point, is Schulze Head, forming the western entrance point to Schulze Cove, a most excellent place for vessels to wait to pass the rapids.

Schulze Cove is  $\frac{3}{4}$  mile wide at its entrance and 1 mile deep in a NW. by N. direction.

Piper Island, low and wooded, lies in the entrance to the cove, the channel between it and Schulze Head being but  $\frac{1}{4}$  mile wide; the shores of the cove are free from dangers except on the NE. side, where some ledges make out about 100 yards. The navigable channel on the eastern side of Piper Island is reduced to about 125 yards by ledges on either shore.

The anchorage is in the middle of the cove in 14 to 16 fathoms, muddy bottom; no particular directions seem necessary.

Furious and very sudden squalls sometimes sweep across Fish Bay from the SE. and blow directly into the cove with a considerable sea; with clear anchors the holding ground is good, though a second anchor is usually necessary. These squalls come without any noticeable warning and do not usually last more than half an hour.

Fish Bay heads in a low valley, well wooded, with moderately extensive flats, dry at low water; on the S. side of the bay, ESE.  $\frac{1}{4}$  S. from Fish Point, is a low projecting point, to the SW. of which anchorage may be found in 15 to 20 fathoms about 250 yards off the beach; it is called Haley Anchorage. W. of this anchorage are numerous kelp patches extending nearly one-third the distance across the bay; these have not been carefully examined, but they should be avoided. The land surrounding Fish Bay is high, rugged, and well timbered.

West of Fish Bay, on the western shore of Peril Strait, is Suloia Bay, broad and open, and near the middle of which is a sunken rock; it is, however, well out of the way of navigation. There is a small low islet in the bay, the rock just mentioned being 300 yards N. by W.  $\frac{1}{2}$  W. from it; there is also a sunken rock 200 yards to the S. by W.  $\frac{3}{4}$  W. of the islet.

The depth of water permits an anchorage at the head of Suloia Bay, but the strong swirls and whirlpools in the strength of the tide render it unsafe, and the close proximity of Schulze Cove makes it unnecessary.

After passing Suloia Point, Peril Strait turns to the NNW. into the Sergius Channel, which at its narrowest part is scarce 100 yards in width, and is rendered very dangerous by the sunken rocks over which the tide rushes in its strength with the sound of a roaring cataract, the current often running more than 10 knots an hour.

Sergius Channel lies between Sergius Point on the NW. and Pinta Head on the SE. Nearly midway between these points is Rapids Island, low, rocky, and sparsely wooded, Little Rapids Island lying about 275 yards to the S. of it.

From Pinta Head a ledge partly above water extends 150 yards toward Rapids Island, leaving a channel about 75 yards in width, called Foul Passage; this passage is never used except by boats at slack water, and in its strength the tide rushes through with great velocity.

The **East Francis** and **West Francis Rocks**, discovered in 1884 and developed by Commander Coghlan, U. S. N., are a danger of great magnitude in entering Sergius Channel.

The **East Francis Rock**, having 6 feet over it at low water, and not marked by kelp, lies 350 yards **SW.** by **S.** from the **SW.** point of Rapids Island, and is of small extent.

The **West Francis Rock**, having 7 feet over it at low water, lies 450 yards **W.**  $\frac{1}{2}$  **S.** from the **SW.** point of Rapids Island. This rock is marked by kelp, which, however, shows only at slack low water. The **West Francis Rock** is now marked by a first-class nun buoy, painted red and black horizontal stripes, and heavily moored about 150 feet **N.**  $\frac{3}{4}$  **W.** from the rock, which is about 60 by 30 yards in extent, and has deep water close-to. Steamers now pass to the westward of this rock. In this vicinity the swirls and whirlpools are very strong while the current runs **S.**

**N.**  $\frac{1}{2}$  **W.**, about 175 yards from the middle of the **N.** side of Rapids Island, is a low bare rock, called **Prolewy Rock**. Extending to the **N.** of this 250 yards, and to the **W.** of it 175 yards to the 18-foot curve, is a very dangerous shoal, called the **Wayanda**, or **Eureka Ledge**, the shoalest part of which is covered about 6 feet at low water. This shoalest part is about 15 yards square, and is about 100 yards **NNW.** from **Prolewy Rock**. **S.** of the rock is also shoal water, but having a deep channel, about 50 yards wide, close to the **N.** side of Rapids Island, but owing to the terrific currents this channel is never attempted.

The **W.** shore of Sergius Channel is steep and heavily wooded, with deep water close-to. A narrow fringe of kelp lies close to the rocky shore line. A primitive beacon marks Sergius Point. It is only visible from the southward. It consists of a number of boards nailed to a couple of trees on the point, and is kept whitewashed. It shows as a white spot among the trees not far above the water's edge. It is very nearly on the range of **West Francis Rock** buoy and **Suloia Point**.

The ship channel between **Eureka Ledge** and the **W.** shore is but 100 yards in width at its narrowest part.

**Shoal Point**, about  $\frac{1}{3}$  mile to the **NNE.** of Sergius Point, has a rocky ledge projecting out about 30 yards. A narrow fringe of kelp extends along the shore between these two points. Above Shoal Point the strong current of the channel rapidly diminishes.

On the eastern shore,  $\frac{1}{2}$  mile **ESE.** of Shoal Point, is **Island Point**, a projecting point ending in a small high-water island, off which a ledge projects 150 yards. In the cove formed between this point and the projecting hook point on the **N.** side of Pinta head, and called **Launch Cove**, is an anchorage in from 7 to 9 fathoms, where a small launch or other small vessel might wait for a favorable tide to pass the rapids. About  $\frac{1}{4}$  mile **NE.** from **Island Point** is a narrow neck, about 150 yards in width and 50 feet high, and wooded, which separates the head of Schulze Cove from the Southern Rapids.

**Mountain Head**, on the eastern shore,  $\frac{1}{2}$  mile above **Island Point**, is a steep rounded point of a mountain of moderate height. The "Bare spot in cliff" noted on the chart, is now so grown over with small trees as to be hardly distinguishable to the eye of a stranger.

**Liesnoi Shoal**, nearly in mid-channel, about 450 yards **WNW.** from **Mountain Head**, has 6 feet over it at low water, and shows kelp when the tide is not too strong. This ledge is about 200 yards in length **N.** and **S.**, and half that in width. It is now marked by a second-class can buoy, painted black, and moored in 6 fathoms close to the edge of the kelp on the **S.** side of the shoal.

**Midway Rock** is a small, low, flat, bare rock, with others that show at low water about 100 yards to the westward of it, with deep water close to the group. This rock is about 500 yards **N.**  $\frac{1}{4}$  **W.** from the buoy on **Liesnoi Shoal**.

**Liesnoi Island** lies 400 yards **NW.** by **N.**, from **Midway Rock**. It is about 100 yards in diameter, and is low and wooded. **N.** of it 100 yards is a rocky ledge that covers at high water. A considerable kelp patch extends 200 yards **E.** of this. The island lies 400 yards off the western shore, which at this point is fringed by a narrow ledge. A channel of not less than 10 fathoms separates the island from the shore, but the customary steamer route is in mid-channel **E.** of the island.

**Point Siroi**, on the **E.** shore, lies about  $\frac{1}{4}$  mile above **Mountain Head**. There is a small islet close to the point, with kelp 100 yards outside of it.

**Bear Bay** is **N.** of **Point Siroi**. Here anchorage in 13 fathoms may be found, which is said to be far enough in not to be affected by the strong tides. It is not, however, a desirable place, and with the fine anchorage of **Deep Bay** so near it is not necessary. **Bear Bay** is shoal near its inner end, and a vessel using it should not go in **E.** of the range of **Bear Bay Island** and the **E.** point of **Big Island**.

**Bear Bay Island** is connected with the main shore by a broad spit that covers at high water. **N.** of the island is a land-locked cove of considerable extent, and easy of access to small steamers. The turn into the contracted entrance is somewhat sharp, but the anchorage is very snug. The entrance to the cove is between **Bear Bay Island** and a small rocky islet 200 yards to the **NW.** of it. A sharp turn to the northward, between a low scrappy island and the main shore, leads through the narrow entrance to the cove. The near proximity of **Deep Bay** renders the use of this cove unnecessary. Kelp patches extend from **Bear Bay Island** about 250 yards to the westward.

**Middle Point**, moderately high and wooded, lies on the eastern shore  $1\frac{1}{4}$  miles **N.**  $\frac{1}{2}$  **W.** from **Point Siroi**. **SW.** by **W.**  $\frac{1}{4}$  **W.**, nearly  $\frac{1}{2}$  mile from **Middle Point**, is an extensive reef, marked by

kelp, and which uncovers about 4 feet at low water. This reef is now marked by an iron spindle, 16 feet high, with a red iron cage on top. There is deep water 150 feet *W.* of the spindle. There is a narrow channel between the reef and the point, but it is of no use except to boats.

**Deep Bay** is on the *W.* shore opposite Bear Bay Island, guarded at its entrance by two large islets and by several islets and rocky reefs.

**Little Island** lies close to the southern entrance point, with a dry passage between; 150 yards off the east end of Little Island is a shoal patch surrounding a very small, rocky head above high water.

**Big Island** lies off the north entrance point of the bay, and has a navigable passage on each side of it. Midway between Big and Little islands is Grass Top Rock, 125 yards *N NW.* of which is a rock showing kelp, which uncovers only at low water. Between Grass Top Rock and Little Island the ground is generally foul, though the rocks show at low water. Another small islet lies farther west, between Big and Little Islands. Off the east end of Big Island a reef and kelp patch extends out about 200 yards.

The passage west of Big Island is much obstructed by reefs, marked by kelp, and should be used with great care.

Vessels may anchor anywhere in the middle of Deep Bay in from 11 to 15 fathoms, mud bottom.

#### DIRECTIONS FOR DEEP BAY.

Take the channel to the south of Big Island, between it and Grass Top Rock, and keep to the island side, passing  $\frac{1}{2}$  the distance from the island to that rock to avoid the covered rock above mentioned. When inside the bay and well past the western end of Big Island, anchorage may be had in about 13 fathoms of water, abreast a prominent landslide on the northern shore. Vessels should not approach the head of the bay too near, as an extensive flat makes out nearly 1 mile. The anchorage ground is about  $1\frac{1}{4}$  miles long by  $\frac{1}{2}$  mile wide.

**Arthur Point**, having the appearance of being an island close to shore, is a prominent, low, wooded point on the *W.* shore *NW.*  $\frac{3}{4}$  *W.* from Middle Point;  $\frac{3}{4}$  mile above the point a mountain stream comes in, off which is a shoal bank. About  $\frac{1}{2}$  mile off Arthur Point, and to the southward of it, kelp marks a ledge running nearly parallel with the shore.

On the eastern shore  $\frac{3}{4}$  mile *N.* of Middle Point is Yellow Point, steep, rocky, and wooded, with kelp 100 yards off the point. The tide swirls are quite strong off this point during its strongest flow.

**Rapids Point**, on the *W.* shore *N.* of Yellow Point, is steep and bluff, with a rocky fringe and kelp close in shore.

**Opasni Islets**, a group of small islets to the *E NE.* of Rapids Point, lie in mid-channel, through which the tide runs with great strength. The group consists of two good-sized islets and several rocky islets, and some rocks that cover at high water.

There are two passages leading to the northward, one on each side of the group of islets, the whole being called the Northern Rapids. **Rose Channel**, the passage on the *W.* side, which follows that shore, is narrow and has a sharp turn, and the tide runs through it strong and in eddies. It is now seldom used.

The **Adams Channel**, on the east side of the group, is a broad, safe channel, and the tides, though strong, are much less objectionable than in Rose Channel. In the bight to the *E NE.* of Yellow Point is an extensive flat, dry at low water, but the deep channel is more than  $\frac{1}{2}$  mile wide.

**Big Rose Island**, of the Opasni group, forms the west side of Adams Channel. The east side of this island makes a small bight, in which is a rock that covers at high water. This rock shows kelp at slack water, and cannot be considered a decided danger in the channel. It lies about 125 yards off shore, on the range of the south end of Big Rose Island and Rapids Point. The rock is now marked by a second-class can buoy, painted black and placed about 100 feet east of the rock in 10 fathoms of water. The kelp on this rock runs under as soon as the tide begins to ebb or flow.

*E.* of Big Rose Island a good-sized stream with well-marked banks comes in on the eastern shore and is called Range Creek.

About  $\frac{1}{2}$  mile *N.* of the Opasni Islets a stream comes in on the eastern shore, off which a rocky shoal projects about  $\frac{1}{4}$  mile.

From the Opasni Islets the general direction of the strait is about *NW.*  $\frac{1}{2}$  *N.* for about  $3\frac{1}{2}$  miles, with an average width of about  $\frac{1}{2}$  mile; the shores are steep and heavily wooded.

On the west shore,  $2\frac{1}{4}$  miles above the islets, is a broad shallow bight; a stream comes in at the bottom of the bight, and a flat, bare at low water, fills the bight from point to point. In the channel the water is from 20 to 35 fathoms deep.

**Pogibshi Point**, on the east shore, 3 miles *NW.* by *N.* from Big Rose Island, is a low, narrow, and projecting wooded point, rising rapidly back to the higher land.

**Poverotni or Turnabout Island** lies 400 yards off the point; the island is about 250 yards in diameter, low, and densely wooded. Between the point and the island is a rocky shoal, surrounded by kelp, and which uncovers at low water. There is a narrow 4-fathom passage through close to the point, but it is only used by boats. Poverotni Island is bold and steep to on all other sides.

**Poison Cove**,\* on the **W.** shore **W.** from Poverotni Island, is about 300 yards in extent at low water, and having 17 fathoms in the middle. Flats, dry at low water, extend about 250 yards from the head of the cove. The shores of the cove are high and steep and scored by land slides.

At this point Peril Strait broadens rapidly, and only that part along the eastern shore followed by steamers has been examined.

On the **N.** side of Pogibshi Point is a broad shallow bight, but which does not afford an anchorage. **NE.  $\frac{3}{4}$  N.**,  $1\frac{1}{2}$  miles from the point and  $\frac{1}{4}$  mile off shore, is a rock awash at low water.

On the **W.** side of the channel,  $2\frac{1}{2}$  miles **N.  $\frac{1}{2}$  E.** from Poveronti Island, is a small wooded islet. **N.  $\frac{1}{4}$  E.** from this islet, distant about  $\frac{3}{8}$  mile, is an extensive reef, which covers at high water, and **NW.** from the islet, nearly  $\frac{1}{2}$  mile, is another reef somewhat smaller, that also covers at high water.

The usual steamer track passes about  $\frac{1}{2}$  mile to the eastward of these dangers.

The eastern shore is high and wooded, with the peaks more or less bare.

**Otstoia Island**,  $4\frac{1}{2}$  miles **N.** by **E.  $\frac{1}{2}$  E.** from Pogibshi Point, is sometimes locally known as Sand Island. It is about  $\frac{1}{4}$  mile long in a **NNE.** direction, and  $\frac{1}{4}$  mile wide. It is low and wooded, and is connected at low water with a rocky ledge, lying  $\frac{1}{8}$  mile **WSW.** from it. The ledge covers at high water. In the same direction, about  $\frac{1}{2}$  mile distant, are two small wooded islets called, respectively, **Elovoi** and **Krugloi** islets.

The channel is to the eastward of Otstoia Island, and is here reduced to about 200 yards in width by a broad flat, bare at low water, projecting about 400 yards off the eastern shore. This flat is formed by the debris from three good-sized mountain streams, and extends for nearly 1 mile along the shore to the southward of Otstoia Island, and nearly 400 yards off shore.

**Deadmans Reach** is the stretch of water outside the flat. A little more than 1 mile **S.** of Otstoia Island is Favorite Anchorage, where good holding ground may be found in about 17 fathoms, at  $\frac{1}{4}$  mile off shore, with the highest peak of the mountain ridge bearing about **E.** This anchorage forms a good stopping place when bound out in thick weather or at night.

The point of the flat abreast Otstoia Island is now marked by a second-class nun buoy, painted red. The buoy is placed in 9 fathoms, about 50 feet **W.** of the point of the flat.

Off the island a white sand beach projects a short distance. The channel here is 200 yards wide, and the least water noted is  $8\frac{1}{2}$  fathoms.

**Broad Island**, moderately high, steep, and wooded, and having a small islet near its **SW.** end, lies **NNE.  $\frac{1}{2}$  E.**,  $2\frac{1}{2}$  miles from Otstoia Island. On the line between these islands, and  $\frac{1}{2}$  mile from the latter, is the dangerous Cozian Rock and shoal. This rock, with the surrounding shoal to the 3-fathom curve, covers a space of  $\frac{1}{4}$  mile in diameter, with a least water on the rock of 6 feet. It shows some kelp at slack water. Nearly midway between Cozian Shoal and Otstoia Island is an 18-foot shoal surrounded by deep water.

The **Cozian Shoal** is now marked by a second-class can buoy, painted black. It is moored in  $4\frac{1}{2}$  fathoms of water on the eastern edge of the shoal. Kelp shows about 100 feet west of the buoy.

From Otstoia Island the eastern shore turns slightly to the eastward to **Nismeni Point**, about 1 mile **NE.** of the three creeks before mentioned. The shores and the point are low and rocky and more or less wooded, the ledges and flats projecting out at low water about 100 yards. From Nismeni Point a rocky ledge projects to the **NE.** about 250 yards. **NE.  $\frac{1}{4}$  N.** 700 yards from the point is a rock that covers at high water, with shoal water extending 200 yards farther out.

**Hooniah Sound** is the broad expanse of water to the westward; it has not been surveyed, but it is known to extend well to the northwestward, and connects by a portage with the waters of Port Frederick on the north side of Chichagof Island.

To the eastward of Nismeni Point the waters of Peril Strait have not been surveyed.

**Broad Island** lies about  $\frac{3}{4}$  mile off shore, and from that island the strait has a general **E.** by **S.** direction for about 10 miles; when turning to the **NE.** by **E.  $\frac{1}{2}$  E.** for about 6 miles farther it enters Chatham Strait between Point Hayes and Point Thatcher, as previously described.

The only anchorage known in this distance is Lindenberg Harbor, on the north shore, about 5 miles inside from Point Hayes and about 11 miles from Nismeni Point. The anchorage is in a small cove with a gravel beach and about 2 cables in extent. The shores are bold-to and rise rapidly to a height of 1,500 feet. The anchorage is in the middle of the cove in about 12 fathoms; it affords good shelter from winds from the northward, but has no protection from southerly winds which draw up and down the strait. About 1 cable **S.** by **E.** from the eastern entrance point of the cove is a rock, awash at high water, called **McLellan Rock**. There is a clear passage, with about 5 fathoms, midway between the rock and the point. The rock is now marked by an iron spindle, 20 feet high, with a white barrel on top; the rock bares about 12 feet at low water, and is about  $\frac{1}{4}$  acre in extent.

**Pestchani Point**, on the south shore of the strait, about  $3\frac{1}{2}$  miles **E.** from Nismeni Point, is a low projecting point formed by the debris of a mountain stream. This entire shore is low and wooded, rising gradually back to the higher land; a careful use of the lead should be made if approaching this shore.

\* This cove, it is said, derives its name from the poisonous character of the mussels found there by the early navigators.



Pt. Craven, N.E. point of Pencil Strait, NNW  $1\frac{1}{2}$  Miles.  
(From U.S. Hydro. (Misc. Chart No. 225))

About  $1\frac{1}{2}$  miles to the **SE.** from Pestchani Point is the entrance to an unexplored inlet several miles deep, having an island and a rock in the entrance. In this vicinity the shore is considerably broken.

On the opposite shore of the strait are several islets close in shore. The north shore is generally steep and high, with timber through which shows an occasional landslide.

**Hanus Inlet** is an opening in the **S.** shore 7 miles from Pestchani Point; it has not been explored, but is supposed to connect by a portage with Kelp Bay, which enters Baranof Island from Chatham Strait. There is an island in the middle of the entrance to Hanus Inlet.

On the **S.** side of Peril Strait, at its junction with Chatham Strait, are numerous islands and reefs. **Fairway Island**, round, high, and heavily timbered, is the northernmost one, the channel being midway between it and Point Craven to the northward.

**Point Hayes** is the northeastern entrance point to Peril Strait; it is broad, rounded, rather low, and continued in an **E.** by **S.** direction about  $1\frac{1}{2}$  miles in Morris Reef. Directly off the point is a small bluff island with some scrubby trees and a single tall pine, making a somewhat conspicuous mark. Off the island are two rather rounded dry rocks, and about  $\frac{1}{2}$  mile farther out a small bare rock; between these and extending 1 mile farther out are reefs and rocks, some of which are awash at low water, and all showing more or less kelp. The outer end of Morris Reef is marked by a first-class can buoy, painted black; it is moored in 8 fathoms at the end of reef. From the buoy Lindenberg Head bears **SW.** by **W.**

In Chatham Strait, about 1 mile **NW.** from Point Hayes, a reef of sunken rock is said to make out from the shore in the same general direction as the point; this shore should not be approached nearer than  $1\frac{1}{2}$  miles.

In Peril Strait,  $1\frac{1}{2}$  miles **S SW.** from Point Hayes, is Point Craven; between these points a deep unexplored inlet, called **Sitkoh Bay**, makes in to the northwestward.

**Port Craven** terminates in a bluff table rock strongly resembling in outline the small island off Point Hayes, and probably carries deep water close-to.

#### SAILING DIRECTIONS FOR INLAND PASSAGE BETWEEN SITKA HARBOR AND HOONIAH SOUND, THROUGH OLGA STRAIT, NEVA STRAIT, AND PERIL STRAITS, ALASKA.

The following sailing directions have been compiled principally from notes and records of a reconnaissance in Alaska, 1884, made by Commander J. B. Coghlan, U. S. N., commanding the U. S. steamer *Adams*, and is published in connection with Chart No. 727, issued in June, 1885:\*

**Harbor Rock**, marked by a spindle, may, at high water, be passed on either side. At low water, or if the rock can be seen above water, vessels drawing 12 feet or more should pass to the northward. This channel is very narrow, and a vessel going through should be kept under good command. The outlines of the rock can usually be seen under water.

When going **North from Sitka**.—After passing Harbor Rock, when the spindle on that rock and the outer end of the "Fish House" are in range, a course **W.** by **N.** carries clear through the narrow passage **N.** of Channel Rock; continue on this course until the Channel Rock beacon is in line with the middle of the **N.** side of Japonski Island, when steer to pass midway between the main shore and the Kasiana Islets.

Many vessels use the more preferable channel **S.** of Channel Rock. In this case round Japonski Island at about 350 yards off shore, until well past the spindle marking the rock; the rock itself shows at low water, and then steer as before directed.

When the Kasiana Islets are abeam, steer for the middle of the space between Little Gavanski and Middle islands, until the westernmost of the Old Sitka Rocks is on the starboard beam; then change course to the northward, passing about  $\frac{1}{2}$  mile from the southern face of Big Gavanski Island. When the northern end of that island is abeam, make a gradual turn to the northwestward, keeping in mid-channel up to Olga Strait.

A passage exists to the eastward of the Old Sitka Rocks, but nothing is gained by using it unless the port of destination is Old Sitka Harbor.

Continue in mid-channel through Olga Strait. About midway in this strait a kelp patch is exposed at slack water, making across the surface, but a set of soundings over the patch failed to develop less than  $4\frac{1}{2}$  fathoms at extreme low tide.

At Creek Point the tide races quite strong, requiring careful steering.

When passing from Olga to Neva Strait, across the northern entrance to Nakwasina Passage, keep the vessel on a line between the projecting point at the **W.** end of Halleck Island and the little high water island off the **SE.** end of Partof-chikof Island; this leads clear of the rocks off Neva Point, Baranof Island. When Neva Strait is well open, head for Whitestone Islet until well up with it; then pass to the eastward of that islet and up the Narrows, steering about midway between the line of Whitestone Islet and the black buoy on one hand and Whitestone Point on the other. Keep on

\* In June, 1890, the Pacific Coast S. S. *Queen*, 341 feet long with a draught of 20 feet when loaded, commanded by Captain James Carroll, made use of this passage without difficulty.



this course until well up to the black (can) buoy, then pass between it and the spar buoy on the end of the spit which makes off the eastern shore.

The turn between the buoys being sharp and the tide strong it is recommended that vessels slow down as they pass the Whitestone Islet going N., or the spar buoy when coming S. After passing the Narrows, keep near to the western shore, on account of foul ground along the opposite side.

Pass close to High Water Islet, near the northern end of the strait, to avoid a sunken patch with  $2\frac{1}{2}$  fathoms over it at low water, lying about 250 yards SW. by W.  $\frac{1}{2}$  W. from the center of the islet. Continue in mid-channel until well past Entrance Island, off Point Zeal. To enter St. John Baptist Bay, open it well and steer for the middle of the narrow arm at its head, where fair anchorage may be had in 15 to 16 fathoms. The winds here are very irregular, coming in heavy gusts from the different gulches, and vessels are constantly swinging. Westerly winds blow home. With northerly winds the gusts are very strong.

If bound to the northward, take a mid-channel course, passing between the Kane Islets and the main shore. Keep this course until Scraggy Island is on the quarter, then turn gradually to the northward into Peril Straits, keeping well over to the western shore to avoid reefs and rocks off the eastern shore.

If bound out through Salisbury Sound.—When Scraggy Island bears S., change course to steer mid-channel through the sound.

In that part of Peril Strait connecting Fish Bay and Salisbury Sound strong tide swirls are encountered, and sometimes at change of tide a 4-foot tide-bore may be met.

From the northward the Channel Islets appear to be in mid-channel, but the only passage is to the westward of them.

When past the Channel Islets, change course to pass close to Suloia Point, skirting the headland at a distance of about 100 yards until abreast of that point. If bound for Schulze Cove, steer direct for Schulze Head, NE.  $\frac{1}{2}$  E. from Suloia Point; if bound through Peril Straits, skirt the headland and stand on for Sergius Point.

The principal danger on the route is the somewhat heavy race and tide swirls through Peril Strait into Fish Bay, which demand from the navigator great caution and watchfulness.

To enter Schulze Cove, continue as above directed and round Schulze Head, passing midway between that Head and Piper Island, and anchor about the middle of the cove in from 14 to 16 fathoms, muddy bottom. Small craft anchor close-in under Piper Island in shoaler water. The passage to the eastward of Piper Island may be used, but it is not recommended. Coming out of the cove, and bound either N. or S., run direct for the middle of Suloia Point Headland until well up to it before attempting to steer for either Salisbury Sound or Sergius Channel, as several kelp patches show along the southern side of Fish Bay. (Want of time prevented a thorough examination of these patches, and only enough was learned to make it proper to advise an avoidance of them.)

If bound North through Peril Strait, skirt Suloia Point headland until the northern part is abeam, then steer to pass to the westward of the buoy marking the West Francis Rock, rounding it in mid-channel to the westward, and keeping close to the western shore between Sergius Point and Shoal Point to avoid the dangerous Eureka Ledge.

If desiring to pass between the Francis Rocks, which is not recommended, when up with the northern headland of Suloia Point, bring the beacon on Sergius Point ahead and the extremity of Suloia Point astern. Keep on this line, which leads between the rocks and passes the buoy on West Francis Rock at 100 yards distance.

West Francis Rock usually shows kelp at slack water. There is no kelp on East Francis Rock.

When the Prolewy Rock off Rapids Island is nearly abeam, which will bring a vessel about 100 yards off Sergius Point, steer to pass within 60 yards from the Chichagof Island shore from Sergius Point to Shoal Point. When the Prolewy Rock bears against the middle of the N. face of Rapids Island, all danger of Wayanda or Eureka Ledge will be passed, and the course can be changed for the eastern shore of the straits, heading for a landslide nearly overgrown with bushes on the cliff of Mountain Head. A line from this bare spot to the small bight on the S. side of Shoal Point clears Liesnoi Shoal, now marked by a black can buoy.

As the flood tide runs strong to the northward, it is necessary to steer thus well to the southward of the shoal. When close up to the Mountain Head shore, stand to the northward, steering to pass about midway between Little Island and Bear Bay Island, with Middle Point a little open on the port bow, until a little past the southern entrance to Deep Bay. This will bring the islet off the eastern end of Big Island almost abeam, and the vessel will be on the line joining the W. head of Bear Bay Island and Arthur Point. Steer on this line toward Arthur Point until Middle Point is a little abaft the beam; then make a gradual turn to the northward to Pass Yellow Point, keeping in mid-channel between that and Rapids Point.

The line of Bear Bay Island (Southwest Head) on with Arthur Point leads clear of a very dangerous rock, which shows at low water, lying about 200 yards W. of Middle Point. An iron spindle now marks this rock. At slack water the whole ledge, of which the above rock is a pinnacle, is marked by kelp, which disappears as soon as the tide makes.

When passing through the reach between Yellow Point and Rapids Point, keep nearly in mid-channel, giving the preference, if any, to the Rapids Point shore, and steer for the northern bluff or bank of Range Creek, opposite Big Rose Island.

The Opasni Islets may be passed on either side, but on account of the easier turns, wider channel, and deeper water, the eastern, or Adams, channel is recommended.

To use Rose Channel, make a sharp turn around Rapids Point and keep close to the shore of that point, passing inside of all islands, islets, and rocks until past the Rose Channel Rock; then gradually haul out to mid-channel and up the next reach; the tide swirls are strong in this channel.

To use Adams Channel, stand on for Range Creek bank, or bluff, until the **SE.** end of Big Rose Island is abeam; then haul gradually to the northward around that island, keeping off about one-third the distance from the island to the eastern shore. This clears the shoal ground on the eastern and a rock on the western shore. This rock shows at low water, and is about 125 yards off the eastern side of Big Rose Island. It is marked by kelp at high water slack, but the kelp disappears as soon as the tide begins to ebb or flood. Rose Island Rock is now marked by a black can buoy, which should be left to the westward. From this rock the **S.** edge of Big Rose Island is just on with Rapids Point.

When up to the northern end of Big Rose Island, haul sharp over to the middle of the channel to avoid shoal ground making off from a creek on the eastern shore,  $\frac{1}{2}$  mile **N.** of the islands. The water is bold-to, and the shoal may be seen in time to avoid it. After passing the shoal, keep a mid-channel course up the reach.

Very careful steering is required between Suloia Point and the Opasni Islets, as tide swirls sometimes take charge of the vessel, and the force of the tides is such as to carry under all kelp and even ordinary 30 feet spar buoys.

Passing out of the Upper (northern) Rapids by either Adams or Rose channels, take a mid-channel course and keep it until Poverotni Island is abeam; then steer for Otstoia Island, passing to the eastward of it, running close-to and leaving the red buoy on the starboard hand.

The channel is only about 200 yards wide, and is on the Otstoia Island side.

Having passed this island, steer a course parallel with the Nismeni Point shore line, heading for the easterly of two big landslides on mountains on the northern shore until Broad Island is almost abeam; then bear up to the eastward for False Linderberg Head.

The inaccuracies in the shore line of the present charts, from Broad Island to Chatham Strait, render it impossible to lay down absolute courses and directions for the navigation of that locality.

With Broad Island bearing **W.** by **N.**, an **E.** by **S.** course will carry clear to abreast Linderberg Harbor and McLellan Rock, from whence a **NE.** by **E.** course will carry clear into and across Chatham Strait, **S.** of Kenasnow Island, paying due regard to the tides. The distance from McLellan Rock to Fairway Island is about 4 miles, and from Broad Island to McLellan Rock about 12 miles.

Cozian Rock is now marked by a black can buoy on the eastern edge of the shoal.

**In going South.**—From False Linderberg Head stand for Broad Island until Otstoia, Krugloi, and Elovoi islets appear to lie just equidistant from each other; Broad Island will then be broad on the starboard bow; then steer for the **NE.** point of Otstoia Island, with a landslide on a mountain on the **N.** shore just astern until well up to the point.

In running through the passage between Otstoia and Baranof islands keep close to the Otstoia shore to avoid the large shoal, which dries at low water and makes off from the creeks opposite the island, filling three-fourths of the apparent channel. Its extremity is marked by a red buoy, which should be left close-to to the eastward.

When clear of Otstoia Island steer for Poverotni Island, and thence in mid-channel down to Upper (Northern) Rapids. Favorite Anchorage, in Deadman's Reach, about 1 mile **S.** of Otstoia Island, is a good anchorage, but a vessel should not anchor inside of the 15-fathom curve. Cozian Rock and Shoal, just to the northward of Otstoia Island, are very dangerous to vessels attempting to use the old Russian steamer track, several vessels having struck on the shoal. By keeping to the eastward of a line joining the eastern faces of Broad and Otstoia islands the shoal may be avoided.

Range Point, in Peril Straits, is very distinct, although much lower than the land just back of it. It is the center point of a headland of a small bight at the entrance to Fish Bay, and is marked by a large bare spot on the cliff, where all vegetation was cleared away in the summer of 1884.

The beacon on Sergius Point is nearly on the line joining Range Point and Suloia Point.

The Francis Rocks, at the southern end of Sergius Channel, were developed by the *Adams*, and named by Commander Coghlan, in honor of Pilot E. H. Francis, who was the first person to get soundings on them.

The following are the bearings from West Francis Rock:

Midway Rock, **N NE.**  $\frac{1}{2}$  **E.**  
 Rapids Island (**N.** edge), **E NE.**  
 Rapids Island (**S.** edge), **E.**  $\frac{1}{2}$  **N.**

The following are the bearings from East Francis Rock:

Liesnoi Island (**W.** edge), **N.** by **E.**  $\frac{1}{4}$  **E.**  
 Little Rapids Island, **E.**  $\frac{3}{4}$  **N.**

## PERIL STRAIT—ANCHORAGES.

**West Francis Rock** has about 7 feet over the shoalest part at mean low water, and is about 30 by 60 yards in extent, with deep water on all sides.

**East Francis Rock**, which appears to be directly in the channel from Point Suloia to Sergius Point, has about 6 feet over it at mean low water, and is of quite small extent.

**Wayanda or Eureka Ledge** is not a pinnacle rock, but consists of a very evenly-curved patch or shoal about 100 by 200 yards in extent, the shoalest part of which has about 6 feet of water upon it at mean low water. This shoal part is about 15 yards square.

**Prolewy Rock** is always uncovered, and is the only pinnacle near. The ledge is very abrupt and falls off from  $3\frac{1}{2}$  to 6 and 8 fathoms in a boat's length; consequently, on the southern side where the northerly set of the current first strikes it, the water boils up and is violently agitated.

## TIDES IN PERIL STRAIT.

The tides at the Southern Rapids in Peril Strait are peculiar. It is high water, full and change, at Sergius Point at 0<sup>h</sup> 30<sup>m</sup>, approximately.

The current at flood tide runs **N.** for 4 hours and **S.** for  $1\frac{1}{2}$  hours, with an intervening  $\frac{1}{2}$  hour of slack water. There is no slack in the current at the turn of the tide from high or low water, but it steadily runs **S.** for about 6 hours, during the first 2 of which the tide rises, and during the last 4 hours of which it falls. A  $\frac{1}{2}$  hour's slack water then follows, after which the current turns and runs to the **N.** for about 6 hours, during the first 2 of which the water falls, and the last 4 hours rises. The time of slack (but not high or low) water at the Lower (Southern) Rapids is about 2 hours before high or low water at Sitka. At spring tides, however, slack water occurs  $2\frac{1}{2}$  hours earlier than high or low water at Sitka.

Vessels should not attempt to pass the Lower Rapids except at high-water slack, or between that time and high water. Never attempt the rapids against the tide.

## ANCHORAGES IN PERIL STRAIT.

If caught between the Upper and Lower rapids a temporary anchorage may be had in Bear Bay in from 16 to 24 fathoms water. The tidal current in this bay is very strong, even when 200 yards out the current may be running 5 to 8 knots.

It is not a harbor in which a vessel can ride out a gale, or even the strong winter winds, as it is contracted and the holding-ground bad.

To anchor in Bear Bay, stand in, in mid-channel, stopping when abreast of the quartz island with which Point Siroi terminates, and anchor just before the northeasterly face of Big Island comes on with the **SW.** point of Bear Bay Island. This gives swinging room in from 13 to 16 fathoms. On the southern side and about halfway up this bay is a ledge of rocks which uncovers at low water. It is to avoid swinging onto this ledge that anchorage is recommended on the line above given.

With Deep Bay in such close proximity, Bear Bay is not recommended as an anchorage.

**Deep Bay**, on the opposite side of the straits, is an excellent harbor. To enter it, take the channel to the southward of Big Island and keep to the Big Island side, passing when abreast of Grass Top Rock, one-third the distance from Big Island to that rock. At two-thirds that distance lies a sunken rock, which uncovers at low water, right abreast of Grass Top, and it is to avoid this rock that vessels should keep close to the Big Island shore. The passage between Grass Top Rock and Little Island is nearly closed by a ledge, bare at low water, and should not be used.

Deep Bay may also be reached by a channel to the northward of Big Island, but as this channel is obstructed by foul ground it is not recommended except for very small craft. When inside the bay, and well past the western end of Big Island, anchorage may be had anywhere in mid-channel.

**Suloia Bay.**—Suloia Bay is not fit for an anchorage, as the water is very deep, 23 to 35 fathoms, and the bottom rocky. Fishing smacks and launches may find temporary anchorage at its head, but large vessels should use Schulze Cove.

The whole country about Peril Straits is heavily wooded. Piper, Rapids, Liesnoi, Little, Big, Bear Bay, Little Rose, and Big Rose islands are all covered with dense woods reaching to high-water mark. Prolewy and Midway rocks are bare; so, also, is the rock off the **E.** end of Big Island, except for one or two small trees.

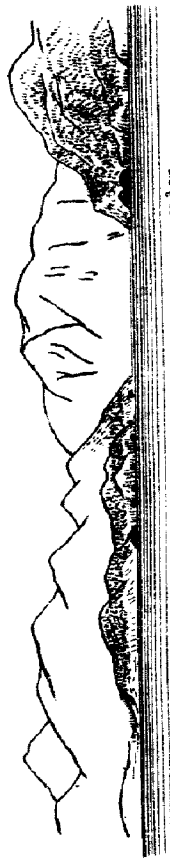
The passage of Peril Straits is difficult and very dangerous, and should not be attempted the first time without the aid of a pilot. Small vessels by following the above directions may run the rapids.

The buoys and beacons in Peril Strait are kept in place by the light-house inspector of the Thirteenth District, who visits them usually once a year.

The strong tides sometimes cause the buoys to shift their positions, and for that reason care should be taken in their use.

## OCEAN COAST—SITKA SOUND TO CAPE SPENCER.

Of this coast from Cape Edgecumbe to Salisbury Sound but little is known. Vancouver passed down this coast, but his description is imperfect, as he made no landings. The Russian-American



N.W.

# S.W. Entrance, Lisianski Strait, 4 Miles.

(From a sketch by Asst. Dall in 1860.)



Sagami Pt.

E. 1/2 Miles

# North Entrance, Lisianski Strait.

(From a sketch by Asst. Dall in 1860.)  
(Telegraphic view)

Cabana Pt.

Company's vessels have traded along the coast, where it is understood some Indian villages then existed.

The present imperfect charts note about  $2\frac{1}{2}$  miles above Cape Edgecumbe a broad shallow indentation as Neva Bay. It has no appearance of shelter, and it is probable that none exists.

At  $4\frac{1}{2}$  miles above the cape is Beaver Point, forming the southern headland to a broad deep indentation, called by Vancouver, Port Mary, though he did not visit it. It is now usually called Shelikof Bay.

**Shelikof Bay** is usually represented as a large bay, with islands near the northern shore, and with the northern entrance point extending prominently toward the S. Most charts represent at the SE. angle of the bay a small cove, to which the name of Port Mary is restricted by the Russians. The Russian Hydrographic Chart, No. 1378, represents the cove to be about 2 cables in extent E. and W., and 4 cables in a N. and S. direction, with soundings of 5 to 7 fathoms, and it would appear to be sheltered by a reef and some islands from N. and W. winds. On the Russian-American chart of 1849 this cove is represented as unsheltered and completely filled with shoals, apparently dry at low water, and on a very different shore line. From verbal reports of Russian navigators in 1867, the bay would appear unsuited for affording shelter or good anchorage.

From the bay a trail is said to extend to Port Krestof, chiefly along the banks of a large stream, which falls in at a point where Port Mary is supposed to be situated.

To the northward of Shelikof Bay the shores appear to be somewhat irregular and indented to Cape Georgiana, at the entrance to Salisbury Sound.

SE. of Cape Georgiana is a broad bight, at the bottom of which appears to be a small cove or bay, called **Sea Lion Bay**. An examination may prove it to contain an anchorage. A group of islands, about 1 mile off shore on the S. side of this bight, are called **Sea Lion Islets**. They are moderately high, and are probably bare rocks.

**Sea Rock** lies 1 mile W. of Cape Georgiana; it is nearly awash at high water and always shows a breaker. There is deep water inside of it.

**Salisbury Sound**, previously described, is here about 4 miles in width, **Klokachef Point**, or more properly the island of that name, being its NW. entrance point.\*

**Fortuna Strait** separates **Klokachef Island** from the mainland of **Chichagof Island**. A partial examination of this strait was made in 1884, and it is noted that "The northern (western) passage into Fortuna Strait should not be attempted."

From Fortuna Strait the Chichagof shore trends W. for about 8 miles to a broad entrance in which are many islands. This shore is thickly infested with rocks, so that even with a canoe it is necessary to keep nearly 3 miles off shore. The broad entrance mentioned, though somewhat smaller than Salisbury Sound, might readily be mistaken for it in misty weather.

A broad mid-channel passage leads between the islands and is probably the **Khaz Bay** of **Tebienkoff**, who only saw the opening in passing. At the SE. angle of this broad entrance, hidden by the low wooded islets, are two inlets as yet unnamed, one nearly 1 mile wide extending about 3 miles to the northward, the other about  $1\frac{1}{2}$  miles wide extending ESE. about 10 miles; its head is separated about  $\frac{1}{2}$  mile from Peril Strait near **Suloia Bay** by a high range of hills. This inlet has apparently deep water and is free from all obstructions, with high, well wooded shores.

Passages exist among the islets, but they are much broken by rocks, and probably dangerous without local knowledge. The mid-channel passage through the group of islands is about  $1\frac{1}{4}$  miles wide, opening due S., and is believed to contain no dangers. There are probably anchorages behind the islands or in the inlets, but there is no information to that effect.

On the N. side of the passage are many low, wooded islands and bare rocks, and behind these in the NE. angle of the bight is the very narrow entrance to an extensive salt water lake, near which is an old Indian village. This is probably **Ilna Bay** of the Russians. The passages between these islands are apparently filled with rocks, though probably navigable for small steam vessels having the requisite local knowledge. The westernmost of this group of islands is probably the **Point Heesman** of **Tebienkoff**.

At this point the shore turns to the NW. and consists of a chain of large and small islands mostly low and wooded, lying about 1 mile off the main shore, thus making a good inside passage for a distance of 12 or 13 miles to Cape Edward, which is the projecting NW. point of a large, low, wooded island outside of which are some small islets and many rocks. Rocks and reefs, upon which the sea usually breaks, extend far to seaward outside this chain of islands, and passing vessels should keep at least 5 miles off shore. It is reported that a rock or breaker has been seen about 10 miles off Cape Edward. Numerous large bays extend into the main shore of this inland passage, but owing to lack of knowledge and difficulty of access they have not at present any practical value.

**Cape Edward** appears to be the S. entrance point to a large bay known to the Indians as **Kukkan Bay**, and which is probably identical with **Portlock Harbor**. This large bay is open to the southward. It is about 5 miles in diameter, the entrance being a little more than 1 mile wide, and apparently free

\* The latest and most reliable information of the coast beyond Salisbury Sound is given by Lieut. Geo. T. Emmons, U. S. N., who, in 1889, made a canoe trip around Chichagof Island.

from danger. A large island lies on the **N.** side of the entrance; **N.** of this is a broad passage, but filled with rocks, reefs, and small islets. In the bay are 5 small islands; several inner bays project to the northward which are well protected and apparently afford good anchorages, with the aid of local knowledge. The land behind Cape Edward is lower than that of the adjacent islands, and is more or less indented and irregular, rising into rugged, broken hills densely wooded except on the higher peaks.

From Cape Edward to Lisianski Strait, a distance of about 15 miles, the shore is bold and rocky with outlying islets, reefs, and rocks from 1 to 2 miles, and even farther off shore. From the cape the coast trends generally **NW.** to Point Urey, the **SE.** entrance point of a passage called **Lisianski Strait**. Off the shore appear a great number of islets, some producing trees, and others entirely barren; the land behind them is timbered, and though hilly and irregular does not rise to any great height.

About 5 miles below the entrance to Lisianski Strait are the **Hot Springs**. There is no harbor here. These springs have long been known and used by the Hooniah Indians. The water, strongly impregnated with sulphur and iron, bubbles up through a crack in the rock several inches long by  $1\frac{1}{2}$  inches wide, just above extreme high water, and the sea has worn out natural bathing holes in the rocks. There are some native houses near the springs, and a large fresh-water lake lies a short distance back from the shore. To the northward the land rises to a height of 2,000 to 3,000 feet.

**Point Urey**, the **SE.** point of the southern entrance to Lisianski Strait, is indicated as high bluff, and sharply pointed toward the **SW.**

**Point Theodor**, the **NW.** entrance point, is low and wooded, with a high back ground of mountains; a few black rocks show close in off each point.

To the southeastward of Point Urey a broad bight extends 2 or 3 miles into the Chichagof shore; it is open to the **S.** and is filled with islets and rocks. It is probably the Bahia de los Islas of the old maps.

**Lisianski Strait** separates Yakobi Island from the Chichagof group. Its southern entrance is about  $1\frac{1}{2}$  miles wide, but the navigable channel is contracted to less than  $\frac{1}{2}$  mile by the islets and rocks lying off Point Urey, and a ledge making out from Point Theodor. A view is given\* from a point 4 miles **S.  $\frac{1}{2}$  W.** from the entrance, where 75 fathoms of water is noted. From this point of view a black, bare, rocky islet, from which extend 5 smaller ones, apparently in a westerly direction, lie off Point Theodor. Behind it the land of Yakobi Island rises gradually in wooded, rounded hills, the most distant ones being of a considerable height. A low knoll or islet, wooded and slightly saddle shaped, marks Point Urey, and on each side of it appear a bare black rock. Farther to the **NE.** the land of Chichagof Island rises abruptly from the strait to a height of several thousand feet with bare peaks while the lower levels are covered with a dense growth of timber.

**Yakobi Island** is irregularly quadrilateral in shape; its **SW.** shore is much indented, the remainder being tolerably compact. It averages 10 miles in length by 6 in width; it is densely wooded and much less elevated than the adjacent portions of Chichagof Island. The southern and northwestern parts of the island are low, and the middle part high with some low saddles. The northern extreme of Yakobi Island is low, bluff at the water, fringed with rocks, and presents a northward rocky face of a greenish appearance resembling soapstone, and was named Soapstone Point by the U. S. Coast Survey in 1880. Behind the point are low, flattened hills densely wooded, with a snow-clad peak (June) in the far distance.

**Point Theodor**, being low and rocky, does not appear from the offing as a conspicuous part of the coast. From this point to Takhanis Bay, about 3 miles, the **SW.** shore of the island is bold, rocky, bare for a short distance, and broken into knobs and hillocks, but back from the shore is wooded everywhere.

**Takhanis Bay** is an indentation of the **SW.** shore of Yakobi Island, extending about 3 miles in a **NE.  $\frac{1}{2}$  N.** direction, and less than 1 mile wide at its entrance; except for its small size and the absence of the islets which mark Point Urey, the entrance to this bay might be mistaken for that of Lisianski Strait, especially in foggy weather. As indicated on the chart, Takhanis Bay is not likely to afford a desirable anchorage.

About 2 miles westward from Takhanis Bay and bearing **NW.  $\frac{3}{4}$  W.** 20 miles from Cape Edward is Cape Cross in

Latitude .....  $57^{\circ} 56' 00''$  N.  
Longitude .....  $136^{\circ} 33' 00''$  W., approximate.

The cape is low, wooded, and guarded by rocks extending nearly 1 mile westward from it; these rocks are mostly large and white; the outermost of the large ones bears a patch of grass, a few stubby trees, and one high, solitary, bare-stemmed tree with an umbrella-shaped top, which forms an excellent mark. There are some low dry rocks outside of this, and the waters hereabout in summer are discolored by the glacial waters from Cross Sound. Soundings in 35 fathoms were found  $1\frac{1}{2}$  miles **S.** of the rocks off the cape, and 25 fathoms the same distance **SE.** by **S.** of them.

From **Cape Cross** the shore trends northward about 3 miles to Surge Bay, a small inlet extending 1 mile in a **NE.** by **E.** direction and less than  $\frac{1}{2}$  mile wide. It is not known to afford an anchorage.

\* From a sketch by Assistant Dale, in 1880.



NW  $\frac{1}{4}$  W

Cape Cross Rocks, 3 Miles.

(From a sketch by Asst. Dall in 1880.)



E. by S.

Cape Cross Rocks, 2 Miles.

(From a sketch by Asst. Dall in 1880.)

From this entrance the coast trends 3 miles in a **NW.** by **W.** direction to Point Bingham, the northwestern extreme of Yakobi Island; the point is a rather low and rocky headland, decreasing in height eastward, and bordered by small islets, outside of which it is said there are no hidden dangers. From Point Bingham the shore of Yakobi Island trends northward and eastward about 5 miles to Soapstone Point, previously described, the western point of the northern entrance to Lisianski Strait. Just **W.** of Soapstone Point is a small bay or inlet in which the Russian charts marked an anchorage.

About 10 miles **NW.**  $\frac{1}{2}$  **W.** from Point Bingham lies Cape Spencer, a very conspicuous promontory. These two form the entrance points to Cross Sound.

Cape Spencer is a low narrow point extending out from the high land from which it makes a bluff descent. Off the cape extends in a southerly direction a line of low rocks, mostly bare; on two of the inner ones are small clumps of straggling trees.

Its geographical position is

Latitude ..... 58° 10' 30'' N.  
Longitude ..... 136° 40' 00'' W., approximate.

determined by the U. S. Coast Survey in 1880.

Point Bingham, by the same authority, is placed in

Latitude ..... 58° 02' 00'' N.  
Longitude ..... 136° 34' 00'' W., approximate.

These positions are in each case about  $4\frac{1}{2}$  miles **SW.** from the positions as shown on the charts now in use.

Lisianski Strait, separating Yakobi Island from the Chichagof group, is about 19 miles in length. From its southern entrance it extends **N.** for about 5 miles, being about  $1\frac{1}{2}$  miles wide; at this point an arm extends **E.** for 5 miles, being 1 mile wide. The strait then turns to the **N NW.** for 5 miles, the channel passing **W.** of a small island on the eastern shore; thence turning again to the **N.** for 2 miles, the channel passing **E.** of another small island on the western shore, when it turns to the **W.** by **N.** for 7 miles to Soapstone Point, and is about  $2\frac{1}{2}$  miles wide; at the same point an arm extends to the **E.** by **S.** for about 20 miles into Chichagof Island, and being about 2 miles wide.

The tides meet between the two small islands noted, and the current runs in swirls from 2 to 3 knots; there is probably foul ground in this vicinity, though the strait is considered navigable. The shores are steep and wooded, and the land rises into mountains from 2,000 to 3,000 feet high.

#### CROSS SOUND AND ICY STRAIT.

The western entrance of this opening lies between Point Bingham and Cape Spencer, and the strait separates the coast of the mainland between Cape Spencer and Point Couverden on the **N.** from the islands off the Chichagof group on the **S.** It is in length about 54 miles, averaging about 8 miles in width, and in some places much obstructed by islands.

The name of Cross Sound is restricted to the waters to the westward of the Indian Islands, the waters to the eastward being known as Icy Strait.

The southern and western portions of Cross Sound are characterized by a great depth of water and freedom from rocks, shoals, or other obstacles to navigation, except such as are immediately adjacent to the land and sufficiently marked as to be readily avoided. The northwestern portions of the sound, though as yet imperfectly known, undoubtedly have many shoals near the numerous glaciers, derived from the material brought down by the glacial streams. During a considerable portion of the year there are usually in the passage many small pieces of floating ice, discolored by mud and gravel, and which present a strong resemblance to sea-beaten rocks nearly level with the surface.

The northern shores of the sound are mostly high, formed by the slopes of the St. Elias Range. The Chichagof group, on the other hand, is comparatively low and wooded.

From Cape Spencer the shores of Cross Sound take a general **N NE.**  $\frac{1}{2}$  **E.** direction; on that bearing, about 13 miles from the cape, is Point Wimbledon. Between the two is the entrance to Taylor Bay, extending something over 10 miles to the **NW.** At the head of the bay is Brady glacier, supposed to originate near Mount Crillon. The bay is much encumbered with ice, and it is not known if a safe anchorage exists.

The bay is about 3 miles wide at the head, and the shores are low or marshy, and divided by various channels dry at low water. The northeastern shore, however, is low and broken, and, trending to the eastward, becomes higher toward the point, and terminates at the sea in steep, rugged, rocky cliffs, off which to the **W.** by **S.** lie 3 small rocky islets and some rocks. Point Wimbledon is the extreme of a narrow peninsula, formed probably by several islands.

Point Lavinia lies 6 miles **SE.**  $\frac{1}{2}$  **E.** from Point Wimbledon, and from Cape Spencer **NE.**  $\frac{1}{4}$  **N.** about 11 miles. The point appears to form a little bluff at its extremity, with rather low land behind it, gradually rising to the higher land to the **SE.** It is well wooded and forms also the **NE.** headland of Port Althorp.

Between Points Wimbledon and Lavinia are the Inian Islands, extending nearly across the strait and forming the line of separation between Cross Sound and Icy Strait. They consist of three



## GRANITE COVE.

principal islands, one low and two high, and a few rocks. The most eastern of the group is East Island, about 3 miles long **NW.** and **SE.**, and  $1\frac{1}{2}$  miles wide; it is bold-to, rocky, rather high, and wooded.

Northwest and Southwest islands are separated from each other and from East Island by narrow passages which appear to be obstructed by rocks. Between Southwest Island and Point Lavinia a channel exists close to the island; it has a width of about 3 cables, and is subject to very strong tidal currents and swirls.

There is a better channel between Point Wimbeldon and Northwest Island, this being a broad, clear passage about 1 mile in width. In this channel are also strong tide rips, and the current sometimes reaches 6 knots.

From Port Lavinia about 6 miles **S SE.  $\frac{1}{2}$  E.** lies Point Lucan, forming the northern extreme of the rocky strip of coast which extends northeastward from the northern entrance of Lisianski Strait.

Between Point Lucan and Point Lavinia is included the entrance to Port Althorp, forming the best and indeed the only known harbor in that portion of the sound. This arm of the sea extends about 10 miles **S SE.  $\frac{1}{2}$  E.** into Chichagof Island, with a width of about  $2\frac{1}{2}$  miles. The port contains two anchorages, of which the southeastern is situated at the head of the bay to the southward and eastward of a small island, and affords anchorage in about 18 fathoms. But little is known of this anchorage; the entrance appears to lie off the **N.** side of the small island at the head of the port.

The entrance to Port Althorp is protected by a number of islands. Its shores are mostly rocky, and rise, especially the eastern shore, densely wooded, to tolerably high mountains. Near the head of the bay the ground is somewhat lower. In the main body of the bay are various groups of rocks above water.

Column Point is the northeast headland of Lisianski Strait; it is low and rocky, with several rock pinnacles or columns near it, and the land eastward of it rises into high mountains, bare above and wooded near their bases, which approach closely to the strait and border it with small, rocky bluffs, alternating with irregular indentations. Rocks and breakers extend west from Column Point about  $\frac{1}{2}$  mile.

Between Column Point and Point Lucan the shores are rocky, with several small coves and indentations. North from Column Point, about 1 mile off shore, is a small rocky islet with some rocks close-to.

The islands off the entrance to Port Althorp are bold, conspicuous, and densely wooded. From a point about 2 miles to the southward from Point Lavinia a group of small islands and rocks extends somewhat more than 2 miles in a **SW.** by **W.  $\frac{1}{2}$  W.** direction. George Island, the largest of the group, is nearly the most western, and while guarded in all other directions by rocks, mostly visible, has on its **S SW.** side a tolerably snug anchorage known as Granite Cove.

George Island is composed of three not very high granite domes, which are connected by low isthmuses to which coves make in from each side. Eastward from it is another island, separated by an unsurveyed passage. To the **N.** and **W.** of George Island are a number of off-standing, generally high, bare rocks. Beyond these,  $\frac{1}{2}$  mile off shore, an open anchorage is indicated by some authorities.

Granite Cove, on the **S.** and **E.** sides of George Island, is about 2 cables in extent, with a contracted anchorage in the center in 18 fathoms, muddy bottom, and protected from all except **E SE.** winds. These winds probably blow at times in very heavy squalls from the mountains of Chichagof Island. The shores of the cove are mostly rocky, with outlying kelp patches, but the small isthmuses have sandy beaches which afford good landings. That between the two northern hills is protected by a rocky point, off which, in the middle of the entrance, is a sunken rock. There is little or no fresh water on this island.

From the southward George Island shows but a single hill with a somewhat peculiar appearing notch on each side of the highest part. The entrance to Granite Cove is quite clear of obstructions. A reconnaissance of the cove was made by the U. S. Coast Survey in 1880 and issued as Chart 741.

The position of the astronomical station on the isthmus connecting the middle and southern hill was

Latitude .....	58° 11' 32" N.
Longitude .....	156° 23' 30" W.

The magnetic declination in 1880 was 32° 15' **E.** The rise and fall of tide observed was about 8 feet.

This position of Granite Cove is about  $5\frac{1}{2}$  miles **SW.  $\frac{1}{2}$  W.** from the position as shown on the old charts, Cape Spencer and other points on the coast, where observations have been made, being relatively moved about the same. It would thus appear that the entire western coast is now charted too far to the north and east, but there is not yet sufficient data to attempt any chart corrections. Such observations as have been made in Chatham Strait show similar errors, so that until the present survey reaches this point only relatively approximate bearings and distances can be given.

Southward from George Island and **W NW.** from Point Lucan about 1 mile is the **SE.** end of Three Hill Island, which extends over 2 miles in a **NW.** direction, with a width not exceeding  $\frac{1}{2}$  mile. It is composed of three high hills united by low isthmuses. Its western and southern shores are guarded by rocks. The northern hill rises 750 feet and the middle 1,300 feet. Between this island and Point Lucan are two small islets and some rocks; a passage exists, but it is narrow and inconvenient.

Between Three Hill Island and George Island is the principal entrance to Port Althorp and to Granite Cove, these islands forming the actual entrance points. Neither should be approached too closely, since there are a number of visible rocks about them, but leaving a probable clearer passage about 1 mile wide.

A single sounding of 9 fathoms is shown in the middle of this entrance, but with 30 to 40 fathoms around it.

No particular directions appear necessary for entering Granite Cove. It is not probably very secure as a winter anchorage.

From Point Wimbleton **NE.** about 2 miles lies Point Dundas, which is a narrow tongue of high land extending to the southwest. It is probable that Point Dundas is about 4 miles west of its position as shown on the charts. Between it and Point Wimbleton is the entrance to an inlet called Dundas Bay, extending in a westerly direction about 8 miles; it is supposed to connect, through a shallow lagoon, with Taylor Bay.

Dundas Bay has 18 fathoms at its entrance; within, its shoals extend from the northern shore nearly across the bay. At its head are many shoals, rocky islets, and rocks, and it is probable that the bay is not safe for navigation. It has never been examined.

From Point Dundas the coast takes a northeasterly direction some 6 or 7 miles to a low point projecting from high land and called Point Carolus. Just to the northward of this point a long reef makes out nearly  $1\frac{1}{2}$  miles eastward, and which is partially uncovered at low water.

## GLACIER BAY.

At Point Carolus the shore turns sharply to the **NW.**, the point forming the western entrance point to an extensive bay called Glacier Bay.

From observations made in Glacier Bay in 1884 by the U. S. S. *Adams*, Point Gustavus is placed in

Latitude .....	58° 23' 00" N.
Longitude .....	135° 54' 00" W.

This point is the eastern entrance point to Glacier Bay. This extensive sheet of water was first made known in 1879, and a sketch was made by the officers of the U. S. S. *Jamestown* at that time. The later reconnaissance and sketch by the U. S. S. *Adams*, Commander Coghlan, U. S. N., affords the most reliable information at hand regarding it.\*

Glacier Bay is about 25 miles long in a **NW.** and **SE.** direction, and from 12 to 14 miles wide, though contracted to one-third that distance at the entrance.

The western shore of the bay is moderately high and steep. Ten miles above Point Carolus is a large cove or bay called Berg Bay, having a good-sized island near the middle, and a small island or look near its northwestern headland. A bar extends across the entrance to Berg Bay, over which  $3\frac{1}{2}$  fathoms can be carried at high water, with deeper water inside. A survey will probably develop a channel and possibly an anchorage within this bay.

About 5 miles above this bay an extensive arm of Glacier Bay makes off to the **WNW.**; a large island, with a smaller one close to on its **SE.** end, lies in the middle of the entrance to this arm. No soundings have been made in this arm. It is probably deep, with possibly some shoals from the glacial debris. Five large glaciers are said to debouch into this arm. Excursion steamers have entered it by the **N.** side of the island to view the glaciers.

Willoughby Island is a large, high, bare rock about  $3\frac{1}{2}$  miles long **NW.** and **SE.**, and  $\frac{1}{2}$  to  $\frac{3}{4}$  mile wide. A small islet lies close to off its **NW.** end, and a shoal is said to exist off its **SE.** end.

To the northward of Willoughby Island are two small bare islets called the Marble Islets, from the rock of which they are composed.

Point Gustavus, the eastern entrance point to Glacier Bay, is quite low and destitute of trees. The land behind it, also low, is studded with sand dunes or moraine mounds, which from a distance appear like islands. The low land behind the point stretches in a northeasterly direction without elevation, except the dunes, which do not exceed 150 feet in height, for nearly 10 miles to the foot of the mountains. In summer the point is thickly covered with grass and shrubbery of a light green color. The beach is of gravel and boulders, shoaling off gradually.

Ancon Rock.—**S.  $\frac{1}{4}$  E.** from Point Gustavus, distant about 1 mile, is a rock and shoal showing some kelp at slack low water; this shoal is of considerable extent, and the rock has about 6 feet over it at extreme low water. From the rock Willoughby Island bears **NW.** by **W.  $\frac{1}{4}$  W.**, and Point Carolus **SW.  $\frac{3}{4}$  S.** Between the rock and Point Gustavus the shoal is somewhat irregular, the lead giving from 3 to 6 fathoms. South of the rock, which is the extreme end of the shoal, the water deepens quickly to 10 fathoms and more.

Point Gustavus should not be rounded nearer than  $1\frac{1}{2}$  miles.

\* Glacier Bay was first explored by a prospector, Mr. Richard Willoughby, and later by Prof John Muir and Rev. S. Hall Young, the first exploration by the Navy following the latter.

The western shore of Point Gustavus curves to the northward and is low, with some low bluffs at intervals, with a stunted and scattered growth of trees. About 2 miles above the point the bluffs are conspicuous, being composed of blue clay, and about 100 feet high; at this point a vessel may find anchorage in 10 fathoms, good holding ground, at less than  $\frac{1}{2}$  mile off shore. At this anchorage, however, the tides at certain stages run with great force, and the eddy brings in large and dangerous icebergs, with which the upper bay is usually filled. The best anchorage in Glacier Bay is in Bartlett's Cove, about  $6\frac{1}{2}$  miles above Point Gustavus. This cove is formed by the mainland on the **SE.** and the group called the Beardslee Islands on the **NW.**; it is of large extent and affords good anchorage in 15 fathoms, blue mud bottom. It is open to the **SW.**, but is quite safe in all weather as a summer anchorage. It is said that comparatively little floating ice comes into this cove, a sketch of which has been published as C. S. Chart, No. 728.

On the **NW.** side of the cove are some houses, and a salmon cannery has been established there. From observations made by the U. S. Navy in 1884, the position of the fish houses is given as in

Latitude .....	58° 30' 00" N.
Longitude .....	135° 49' 00" W.

At the eastern entrance point is a boulder reef mostly bare at low water, extending out a short distance. On the **E.** side, at the head of the cove, is a small, low, grassy islet with shoal water extending out on its western side; the passage **N.** of it is also shoal.

The cove is somewhat difficult to make out until well up to it, as the entrance blends in with the surrounding land.

No particular directions are necessary. Round Point Gustavus at  $1\frac{1}{2}$  miles distance; a **N.** course carries in in mid-channel. Anchor in 15 fathoms off the houses (do not go above them); 8 to 10 fathoms of water will be passed over just outside the anchorage.

The Beardslee Islands, low, hilly, and sandy, lie **NW.** of Bartlett Cove, and close along the extensive flat lands forming the eastern shore of the lower part of Glacier Bay. Beyond these islands the bay is filled with shoals and sand dunes formed by the glacial debris from the head of the bay; many of these shoals show only at low water, and some of them are never uncovered. High mountains lie to the eastward of the head of the bay.

On the **NE.** side of the head of the bay the great Muir Glacier enters, having its sources far in the interior. This glacier is nearly 2 miles across its face, and is about 300 feet high in a perpendicular wall, from which enormous masses are constantly breaking off into the sea. At  $\frac{1}{4}$  mile off the face, nearer than which it is dangerous to approach, the water is very deep. At the eastern corner of the glacier face a swift flowing stream comes from under the ice and from that point the ice has so melted that the top of the glacier can be readily reached.

An extensive shoal, partially uncovered at low water, lies off the western point of the glacier, and it with many others of the shoal, is usually marked by large anchored icebergs forming good guides to the navigation of the bay, which is usually filled with floating ice.

Glacier Bay is entered by the excursion steamers during the season. It is usual to pass in mid-channel to the westward of Willoughby Island; shoal water extends well to the westward from Beardslee Islands, and a shoal is said to extend **SE.** from Willoughby Island a considerable distance. After passing the rocky patch above water that lies 300 yards off Willoughby Island, steer to leave the Marble Islands well to the eastward; a line of grounded bergs usually marks the **SE.** edge of the shoal. Steer for the **E.** side of the glacier, and an anchorage may be obtained at half a ship's length off the sand beach in the current of the glacial stream before mentioned; this current will hold a vessel securely from swinging on the beach, or an anchorage in 18 fathoms may be found rather close in shore, at a little distance farther down the eastern shore. Acker Cove, about 3 miles below the glacier, does not afford a ship-anchorage.

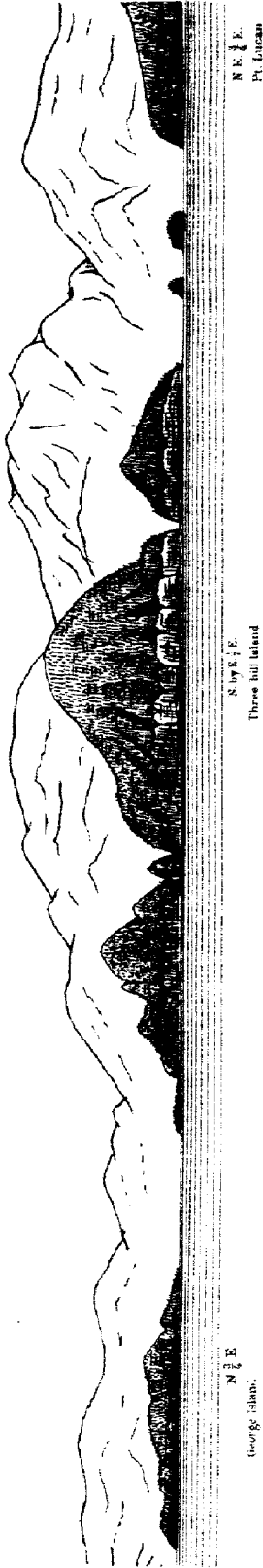
The navigation of Glacier Bay is not considered safe without the aid of local knowledge.

Off the entrance to Glacier Bay strong tidal currents and eddies will usually be encountered, and this part of Icy Strait is exceedingly dangerous for sailing vessels, since there is much thick weather here, and much ice in the shape of large floes or small bergs; these floes are often low and mud-colored, and almost impossible to distinguish at night. The tide runs at least 3 knots an hour, the flood running to the westward.

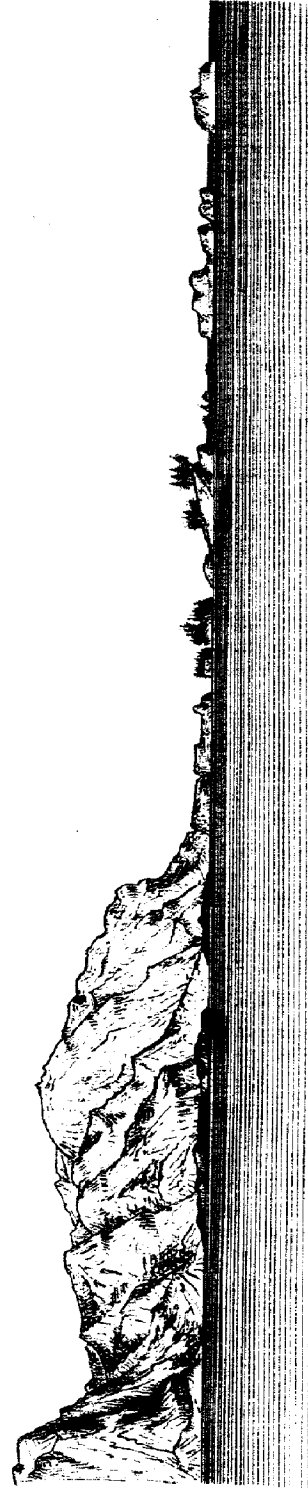
The shores of Icy Strait from Point Gustavus extend in a northeasterly direction, curving to the eastward, forming a bight whose northern shore is the margin of the low land before noted in Glacier Bay, and which shoals off gradually for a considerable distance. This bight contains a large island called Pleasant Island, 7 or 8 miles in length and about 1 mile wide; it is moderately elevated, having three distinct hills, the middle one the highest; the shores are low and the island well wooded.

About  $\frac{3}{4}$  mile **S.** from the middle or highest point of Pleasant Island is a sunken rock, or reef, showing kelp when the tide is not running too strong.

There is a channel, called Icy Passage, to the northward of Pleasant Island, but it is somewhat shoal and should be used with caution; the deepest part of this passage is on the island side, and more or less floating ice is found here.



N.E. 1/2 E.  
 Three hill island  
 Entrance to Port Althorp  
 (From a sketch by Asst. Engr. in 1880)  
 (Telegraphic view.)



Cape Spencer, entrance to Cross Sound E.N.E. (mag.) 6 Miles

The **NE.** point of Pleasant Island is called Noon Point, and from it a ledge of rocks makes off about 3 cables, and is covered at high water. At the **SE.** point of the island are some dry rocks, and about 2 miles to the eastward from it is a group of rocks called Porpoise Islands. The passage to the northward of them has soundings in 10 to 15 fathoms, where a vessel may anchor, though exposed to southerly winds.

From the **Porpoise Islands** a long, low ledge extends  $\frac{1}{2}$  mile to the southward, and from the largest island another ledge extends an equal distance in a northerly direction.

On the main shore, about 2 miles northeastward of the **Porpoise Islands**, is a deep, narrow inlet, trending to the northwestward. It is unsurveyed, but is said to be about 10 miles in length; near its entrance is a small Indian village. The inlet is called Hudson Bay Inlet; it probably contains one or more anchorages.

From this inlet the shore trends about **E SE.** for nearly 10 miles to Swanson Harbor, without deep indentations and no apparent foul ground extending far off shore.

**Swanson Harbor** is formed by a group of islands, rocky islets, and reefs lying off the extreme **SE.** point of the mainland at the junction of Icy Strait with Lynn Canal.

**Couverden Island**, the largest of the group, lies farthest to the eastward; it is moderately high and wooded; its **SE.** point, called Point Couverden, lies in

Latitude .....	58° 11' 15'' N.
Longitude .....	135° 03' 00'' W.

It has some outlying ledges. From the **NE.** side of the island a narrow neck extends **NW.**  $\frac{3}{4}$  mile, to within 150 yards of the mainland, leaving a narrow entrance to a well-sheltered bay, which has some foul ground and is not recommended as an anchorage.

**Rocky Islet**, a bare rock, 54 feet high and of moderate extent, lies  $\frac{3}{4}$  mile **SE.** of Point Couverden; from it the entrance to Swanson Harbor bears **WNW.**  $\frac{1}{4}$  **W.** The passage inside this islet is now generally used in passing from the northward into Icy Strait, giving the islet side of the channel the preference. There is deep water on either side of this islet.

**S.** and **W.** of Couverden Island an indentation of the mainland forms the head of Swanson Harbor; the **S.** side of this harbor is mostly formed by Ansley Island and Entrance Island and their associated rocks. The passages between the mainland and Ansley Island and that island and Entrance Island are dry at low water and filled with rocks.

**Sharp Ledge\*** is a slight projection, bare at low water, **NE.** from the **SE.** point of Entrance Island.

On the **N.** side of Swanson Harbor a ledge, called "No use Ledge,"\* which bares at one-fourth tide, and an island 150 feet high, and sand shoals and rocks bare at low water, fill the passage (about  $\frac{1}{4}$  mile wide) between Couverden Island and the main shore.

#### DIRECTIONS FOR ENTERING SWANSON HARBOR.\*

To enter Swanson Harbor get Rocky Island right astern, in a course **WNW.**  $\frac{1}{4}$  **W.**, and stand in; keep Couverden Island about  $\frac{1}{8}$  mile on the starboard beam, until up to inner end of Entrance Island, to clear the ledge off Entrance Island; then a mid-channel course up to end of Couverden Island. Then keep Ansley Island the same distance until up to the anchorage in 14 to 16 fathoms, soft bottom.

This harbor should only be entered at low water; it was formerly frequented by the small vessels of the trading companies, but is not attempted by large vessels.

**W.** of Couverden Island the main shore appears low and densely wooded, and backed by steep and rather barren high mountains.

#### THE SOUTH SHORE OF ICY STRAIT

from the Inian Islands to Point Augusta is very irregular and broken.

**Lemesurier Island** lies **S.** from Point Gustavus, and nearly in the middle of the strait, extending about 8 miles in a **N NE.** and **S SW.** direction, and about 2 miles broad. It is moderately high and wooded; reefs make out from nearly all the projecting points on the southeastern side of this island. Near the middle of the southeastern side is a shallow bight, with a small cove penetrating more deeply near its southern end called Willoughby Cove; it is about a cable in extent and affords anchorage in 8 to 14 fathoms, good holding ground, but is open to the **SE.**; on the beach at the head of this cove is a small Indian village.

A very strong current sets by outside the cove, creating strong eddies, and bearing fragments of ice. It is said that the ice never enters the cove, though much is washed ashore in the adjacent bight. The **NE.** point of this bight is called Iceberg Point; a reef extends  $\frac{1}{4}$  mile **E SE.** from it, showing at low water, and in rough weather breaking as much farther out to the eastward. This anchorage has nothing to recommend it.

The **NE.** end of Lemesurier Island lies about  $2\frac{1}{4}$  miles **S SE.**  $\frac{1}{2}$  **E.** from Point Carolus.

\* Named by U. S. Coast and Geodetic Survey.

## THE CHICHAGOF SHORE OF ICY STRAIT.

From Point Lavinia the southern shore of Icy Strait trends nearly **E NE.** for about 10 miles, having numerous small open bays, and with rocky shores. Immediately eastward of Point Lavinia is Idaho Inlet, extending 7 or 8 miles in a southeasterly direction, with an average width of  $\frac{3}{4}$  mile, and clear navigation to within 1 mile of its head, where two large streams coming in have formed a shallow bank; it is probably a good harbor.

About 10 miles from Point Lavinia, a point with a small islet off it projects from the shore, forming a large open bay several miles in extent, beyond which the shore line changes its direction to about **N.** by **E.** This open water has been called Mud Bay. The point forming the western extreme of the bay is known as Quartz Point; it is low, and from the northward appears like a group of islands. The shore of its **NW.** part, which appears like an outer island, is marked by large masses of white quartz. The small island off the point is called Goose Island, and at low water a reef between them uncovers nearly its whole length. The southern shore of Mud Bay has the appearance of an immense sand spit. There is an extensive mud flat with soundings on it, varying from 4 to 7 fathoms, about  $\frac{3}{4}$  mile off the **W.** shore of the bay; 6 fathoms, muddy bottom, was found about  $\frac{3}{4}$  mile eastward from Goose Island.

Off the eastern point of entrance to Mud Bay a rock is reported as uncovering at low water at about  $\frac{1}{2}$  mile off shore. A short distance to the eastward another point makes out, about 1 cable off, which is another rock covered at high water, and in the middle of the bight **E.** of this second point is a sunken rock about 150 yards from shore. This latter bight is the second one **W.** of Point Adolphus, the first being a mere curve that hardly indents the shore line.

Point Adolphus lies about 6 miles **N.** by **E.** from Mud Bay, and about  $6\frac{1}{2}$  miles **SE.** by **E.** from Point Gustavus. It is the northernmost point of Chichagof Island, and is low, steep-to, and well wooded. Its geographical position is about

Latitude.....	58° 16' N.
Longitude.....	135° 47' W.

From Point Adolphus the shore trends generally about **E SE.** for nearly 9 miles to the entrance to Port Frederick, off which are some outlying islands.

Just **E.** of, and under Point Adolphus, is a bight about  $\frac{1}{2}$  mile in width and 1 cable deep, which affords good anchorage in case of meeting with a fog in that vicinity. There is a small Indian village on the **W.** side of this bight; between the village and the point is a reef a good distance off shore, and always covered, but marked by kelp. In the middle of the bottom of the bight is a steep bluff not very high; between the bluff and the **E.** point of the bight a good-sized stream comes in. The anchorage is in 8 to 10 fathoms just outside the line of the bluff and the **E.** entrance point, about  $\frac{3}{4}$  cable off shore. In the vicinity of Point Adolphus much floating ice is usually met with at all seasons of the year.

Port Frederick, about 9 miles **E.** from Point Adolphus, is an inlet of considerable size and possible importance should the mineral deposits known to exist in that locality prove of any value. It has never been fully explored, but is known to connect by portages and unsurveyed passages with the waters of Peril and Chatham straits. The entrance to Port Frederick faces to the **N.**, and is about 2 miles wide. Near the western headland are several good-sized islands; the northernmost island may be passed on either side, but the usual passage is outside of all the islands.

On the **E.** side within the entrance, and some 4 miles to the southeastward from the northernmost island, is a low wooded island some 2 cables in extent, called Pitt Island. On the main shore,  $\frac{1}{4}$  mile **N.** of Pitt Island, is a large village of Hooniah Indians, from which the anchorage derives its name of Hooniah Harbor, the harbor being the cove between Pitt Island and the main shore to the northward. From the **E.** end of Pitt Island to the main shore there is a bar or flat having but about 6 feet over it at ordinary low water, and extending into the bight **E.** of the island, with only 1 or 2 fathoms of water.

The northwestern point of the harbor, called Entrance Point, is a high bluff showing a perpendicular wall about 150 feet high, of brownish red rock; the end of this point is indented by a small bight, which is mostly occupied by a rocky pinnacle about 40 feet high and very close to shore; on its top are a few stunted trees. Within 15 yards off the rock is 6 fathoms of water. About 1 cable northward of Entrance Point a shoal makes out nearly 2 cables, dropping suddenly into deep water. Off the village, and also off the **N.** side of Pitt Island, are broad sand beaches.

The general appearance of the land is high, sloping in either direction northwestward and southeastward from near Entrance Point, where the extreme height is about 300 feet.

Along the line of the islands on the western side of Port Frederick there is said to be foul ground to near the center line of the entrance.

Halibut Rock, which uncovers at low tide, lies about **S SE.**  $\frac{1}{2}$  **E.**  $\frac{3}{4}$  mile from the southernmost island.

The anchorage for small vessels is in mid-channel between the shores of Pitt Island and the western end of the Indian village, in about 12 to 14 fathoms. Larger vessels should anchor in 16 to 20 fathoms, just inside the line of Entrance Point and Grave Point of Pitt Island. The holding ground is good, but the anchorage is not well protected.

## DIRECTIONS FOR PORT FREDERICK.

When standing into Port Frederick from Icy Strait, keep near the eastern shore to avoid Hali-but Rock, and anchor as above directed.

Of the remaining portion of Port Frederick no description can be given, as no examination has yet been made.

On the eastern shore, N. of entrance Point and near to it, is a low grassy point off which a bank extends about half a cable. Thence northward and eastward to Point Sophia the shore may be approached to half a cable.

Point Sophia, the eastern entrance point of Port Frederick, is about 3 miles from Entrance Point.

In Icy Strait, about 3 miles N. by E.  $\frac{1}{2}$  E. from Point Sophia, are two low, rocky, wooded islets, called The Sisters. Off the southernmost of The Sisters a reef, which uncovers at low water, makes out to the southeastward about  $\frac{1}{4}$  mile. South of that is a clear passage between the islands and Point Sophia.

There is also a reef, showing kelp at slack water, lying about 1 mile to the W SW. of The Sisters, on the range of the northernmost island and the land near Swanson Harbor. This reef is not generally known. It uncovers a few feet at low water in two long separate heads. The Sisters should not be approached on the western side nearer than  $1\frac{1}{2}$  miles.

Eastward from Point Sophia the shore is compact, not high, and well wooded, with some rocky islets extending a mile or more off shore.

Spasskaia Island, low, flat, and heavily wooded, lies about 3 miles to the eastward of Point Sophia. From The Sisters it bears S SE. The island lies about 1 mile off shore, with an anchorage inside of it.

About 4 miles E. of this island is the harbor of the same name. Spasskaia Harbor was surveyed in the early part of this century by the Russians, who give the position of the anchorage, in the NE. corner of the bay as

Latitude.....	58° 06' N.
Longitude.....	135° 17' W.

The harbor is described as being about 1 mile long SW. by S. and NE. by N., and a little less than  $\frac{1}{2}$  mile wide at the entrance. Just within the eastern entrance point is a small cove, and another cove, very shoal,  $\frac{3}{8}$  mile within the point. On the western shore is an open cove midway from the western entrance point to the head of the harbor and having less than 3 fathoms water. At the head of the harbor the shores form a rather sharp angle where two streams come in, forming a bank and shoaling the water of the inner half of the harbor to less than 4 fathoms, but which rapidly increases to about 40 fathoms nearly in the middle of the entrance. The harbor is quite open to the northward.

The cove mentioned as just within the eastern entrance point is very small, but might afford a shelter to small vessels in about 3 fathoms, close under the northern headland, which appears to be high, bluff, and bold-to. The western entrance point is low, with some outlying rocks.

East of Spasskaia Harbor is a somewhat prominent projecting point, on the E. side of which some authorities place another bay of the same name and description as the one above. So little is known, however, of the coast in this vicinity, that the existence of an anchorage E. of the point is as yet without verification.

From the above-mentioned projecting point the coast to Point Augusta trends about E., and the distance is about 8 miles.

Point Augusta, described on page 163, is the NE. point of Chichagof Island, and is the turning point from Icy Strait into Chatham Strait.

**Hanus Reef.**—Near the middle of the eastern end of Icy Strait is a dangerous reef called Hanus Reef. At low water the highest part of this reef is about 7 or 8 feet high; it covers at about one-third flood. It consists of a patch about  $\frac{1}{4}$  mile in extent, including a series of detached rocks. At certain stages of the tide a 2 or 3 knot current is said to set directly across the reef.

Hanus Reef is now marked by a spindle and by a buoy, as follows:

An iron spindle 20 feet high is placed near the center of the reef. From the reef

Point Retreat bears N NW.  $\frac{1}{2}$  W.

Rocky Islet near Converden, NW. by W.  $\frac{1}{2}$  W.

Point Augusta, SE.  $\frac{1}{2}$  E.

Point Sophia, SW. by W.  $\frac{1}{2}$  W.

The Largest Sister, W.  $\frac{1}{4}$  S.

A second-class can buoy, painted red and black horizontal stripes, is placed in 18 feet of water on the E. side of the reef, about 100 yards distant from the spindle. From the buoy

Point Augusta bears SE.  $\frac{1}{4}$  S.

Bare Rock (Rocky Islet), NW. by W.  $\frac{1}{2}$  W.

Hanus Reef spindle, SW. by W.

The reef is about 4 miles from Point Converden.

Vessels passing up or down Chatham Strait will be clear of the reef by keeping to the eastward of a line joining Point Augusta and the bold mountain which is very conspicuous on the western shore of Lynn Canal.

If bound into Icy Strait from the southward, round Point Augusta at  $\frac{1}{2}$  mile distance, and steer for The Sisters, which bear **W.** by **N.** from Point Augusta, until within 1 mile of them, then haul up and pass them to the northward; or the **N.** shore of Chichagof Island may be followed at about 1 mile off shore.

Entering Icy Strait from the northward, Hanus Reef is not a serious obstacle to the navigation.

## LYNN CANAL.

The extension of Chatham Strait to the northward from Point Converden has been called Lynn Canal, and extends in a general **NW.** direction to its head, about 55 miles, with an average width of about 6 miles.

A long peninsula divides the waters at its head into two arms, called, respectively, Chilkat and Chilkoot inlets; these inlets terminate in extensive mud flats and glacial rivers.

Lynn Canal is nearly free from all dangers to navigation. The deepest water, 413 fathoms, is 5 miles below Point Retreat; from there up to the head of Lynn Canal the depth in mid-channel decreases gradually to 127 fathoms **E.** of Point Seduction. The shores are, as a rule, high and densely wooded, with many bare mountain peaks, with small glaciers in nearly every ravine. The greater part of the eastern shore is a steep, high, bare bluff. The water is generally very deep. The climate is more dry and sunny than that about Sitka.

At Point Couverden, Lynn Canal is about 5 miles wide. A small rocky islet, 12 feet high, lying  $1\frac{3}{4}$  miles **N.** from Point Converden, must be left to the westward, and should not be approached closer than 200 yards. This islet is the outer one of a group of islands, rocky islets, and ledges, bare at low water, extending 5 miles **SE.** by **E.** from a slight projection of the main shore, separating two bights which are open to the **SE.** and are not recommended as anchorages. The easternmost bight is just inside of Point Howard.

Point Howard lies 6 miles **N NW.**  $\frac{1}{2}$  **W.** from Point Couverden. About 2 cables **SE.** from Point Howard is a rocky ledge bare at low water. On the opposite shore, on Admiralty Island, is Funter Bay, off the entrance to which are several islets; one, standing well out into Chatham Strait, has a projecting reef to the northwestward in the direction of its length for about 2 cables distance.

About 10 miles above Funter Bay is Point Retreat, in

Latitude.....	58° 24' 30" N.
Longitude.....	134° 56' 10" W.

It forms the **NW.** extreme of Admiralty Island, and is a long, low, partly wooded point, rising very gradually to the higher land to the **SE.**; **SE.** by **E.**  $\frac{1}{2}$  **E.** from Point Retreat is Lone Mountain, forming an excellent landmark for this vicinity. A reef extends out from the point about  $\frac{1}{2}$  mile, and  $\frac{1}{2}$  mile **S.** of the point on the **W.** side is a reef making out to the **NW.** by **W.**, nearly parallel with the shore, about  $\frac{1}{2}$  mile; both these reefs are nearly covered at high water. Nearly 5 miles **SE.** by **S.** from Point Retreat is a low, rather broad, projecting point, called False Point Retreat, from its resemblance to the true point when approaching from the southward. It is not considered advisable in rounding Point Retreat to approach it much nearer than  $\frac{1}{2}$  mile.

A sunken rock, having 17 feet at low water, was discovered and developed by the U. S. Coast Survey Steamer *Patterson* in June, 1890. It lies 1 mile **NE.**  $\frac{1}{2}$  **N.** from Point Retreat, and  $1\frac{1}{4}$  miles **NW.**  $\frac{1}{4}$  **W.** from the **N.** end of the outer Barlow Islet, and is on the range between the **SW.** side of Hump Island and Favorite Reef buoy. This rock, called Faust Rock, is very near to the fairway of vessels passing through Saginaw Channel.

At Point Retreat the waters of Stephens Passage, from the eastward, meet Lynn Canal. To the northward of the point is a group of two large and numerous small islands, separating it from the mainland and dividing the passage into two channels named, respectively, Saginaw and Favorite channels.

When rounding Point Retreat from the southward a large glacier, called Eagle Glacier, is visible in a direction **N.** by **E.**, proceeding from the high mountains on the mainland.

**Barlow Cove.**—On the **E.** side of the Point Retreat Peninsula is a narrow inlet extending  $5\frac{1}{2}$  miles in a **SE.** direction from Point Retreat, called Barlow Cove, already described on page 152.

**Shelter Island**, the largest of the group of islands separating Point Retreat from the mainland to the northward, is about 8 miles long **NW.** by **W.** and **SE.** by **E.**, and averages about 1 mile in width. At the **NW.** end of the island is a high dome-shaped peak, which forms an excellent landmark when coming down Lynn Canal. The island is densely wooded.

The **N.** end of Shelter Island bears from Point Retreat **N.** by **W.**  $\frac{1}{2}$  **W.**, distant  $4\frac{1}{2}$  miles, and the **S.** point bears **E.**  $\frac{1}{2}$  **S.**, distant  $4\frac{1}{2}$  miles.

Saginaw Channel separates Shelter Island from Admiralty Island; described on page 151.



**Lincoln Island** lies W. by N. from Shelter Island; they are separated by a navigable passage  $\frac{1}{2}$  mile wide between the narrow ledges making out equally from each island. Lincoln Island is wooded and comparatively low; its southern shore is arched to the southward.

**Hump Island**, lying between Point Retreat and Lincoln Island, and 3 miles from the former, is about  $\frac{3}{4}$  mile in length and  $\frac{3}{8}$  mile wide. It is 265 feet high and wooded, and is named from its appearance; reefs and rocks extend out about  $\frac{1}{2}$  mile from each end in their direct prolongation. A rock is reported  $\frac{1}{4}$  mile off shore and bearing S. from the highest part of the island, but its existence is not yet confirmed.

**Ralston Island** is close to and in the prolongation of Lincoln Island.

**Little Island**, small, round, and wooded, lies N. by W.  $\frac{1}{2}$  W.  $\frac{1}{2}$  mile from Ralston Island. In the same direction, beyond Little Island, a rocky ledge, partly showing at high water, extends  $\frac{3}{4}$  mile.

**Vanderbilt Reef** lies N. by W.  $\frac{1}{4}$  W.  $3\frac{3}{4}$  miles from Little Island. It is a somewhat dangerous ledge, which uncovers about 10 feet at low water. The bare part of the reef is about 75 yards in extent at low water. This reef is now marked by a first-class nun buoy, painted red and black horizontal stripes, and is placed in 19 fathoms of water, about 150 feet northward of the highest part of the reef, which bares about 10 feet at low water. From the buoy

Little Island bears S. by E.  $\frac{1}{2}$  E.

Whidbey Point, SW.  $\frac{1}{4}$  W.

Point Bridget, W. by N.  $\frac{3}{4}$  N.

The Lynn Sisters are two small, low, islets, with small, projecting reefs, lying on the western shore of Lynn Canal, close to shore; at low water they are connected with each other and with the mainland. From them Ralston Island bears N. N. E.  $\frac{1}{2}$  E.

Favorite Channel and the islands lying N. and E. of Shelter Island are reviewed in connection with Stephens Passage and the connecting waters to the eastward.

Passing up Lynn Canal from the southward, Vanderbilt Reef is not in the way; but from the northward, or entering the canal through Favorite Channel, it forms a somewhat serious danger to navigation, but it is easily avoided.

**Point Whidbey** lies nearly 12 miles NW. by W.  $\frac{1}{2}$  W. from Point Retreat. Point Whidbey is a rather remarkable cape, whose face is 3 miles in length in a N. N. W. and S. S. E. direction.

**St. James Bay** lies just inside of Point Whidbey. This bay extends 5 miles in a direction NW. by W., is 1 mile wide at the entrance, and expands gradually to a width of 2 miles near its head; here a large stream enters, forming extensive mud flats.

This spacious bay affords an anchorage in 20 fathoms, soft bottom, but is open to the S. E. winds. The usual gold mine is found near this harbor.

Unless commercial interests demand, this harbor will not be used, as it lies in close proximity to the excellent William Henry Harbor.

**Lynn Brothers** are two conspicuous islands just inside the southern entrance to St. James Bay. The S. E. point of the South Brother lies W. by S.  $\frac{1}{2}$  S.,  $1\frac{1}{2}$  miles from Point Whidbey.

From Point Whidbey the W. shore of Lynn Canal extends in a N. W. direction, with some indentations and rocky shore line, about 3 miles to a narrow inlet leading into a boat harbor, being a basin of  $\frac{1}{2}$  mile in extent, having  $12\frac{1}{2}$  fathoms greatest depth and  $3\frac{1}{2}$  fathoms at the entrance. It affords an anchorage for boats only. From the mouth of the boat harbor the W. shore of the canal continues high, rugged, and steep in a northwesterly direction 5 miles to a moderately high point, which forms the eastern entrance to

#### WILLIAM HENRY BAY.

This bay is about  $\frac{3}{4}$  mile long and uniformly about 4 cables in width; it is easy of access and affords the best shelter of any anchorage in this vicinity. The winds never blow home, the anchorage is good, and the depth of water moderate. Stand in for the middle of the entrance, head for the center of the flats at the head of the cove, and when the second waterfall is on the starboard beam anchor in 14 fathoms, soft bottom, with plenty of room to veer and swing clear of everything.

The shores are high and bold, and a fine trout stream, called Beardslee River, makes in at the head. Wood and water are easily procured.

The *Patterson* anchored in this harbor for some three weeks in June and July, 1890; strong gales blew at times in the canal, but none came in.

Pilots give this place an excellent name as a winter anchorage.

About 4 miles to the N. W. from William Henry Bay is Endicott River, coming in from the westward through a narrow, deep gorge in the mountains; the mouth of the river is filled with a wide dry sand bar, through which the river has cut a narrow channel close around the cliff on the southern side; a broad shoal makes out from the mouth of the river nearly  $\frac{1}{4}$  mile.

**Bridget Cove**.—Three miles above North Island, on the eastern shore of Lynn Canal, lies Mab Island, behind which is Bridget Cove, with good anchorage for small vessels in 6 to 10 fathoms.

**Point Bridget**, on the E. side of Lynn Canal, is low and wooded, bearing from Point Whidbey N.  $\frac{1}{4}$  E., distant  $7\frac{1}{2}$  miles. It is the southern entrance head to an extensive inlet called **Berners Bay**,

## CHILKAT INLET.

which extends in a northerly direction about 10 miles; the northern entrance point, called Point St. Marys, bears from Point Bridget about NW.  $\frac{1}{2}$  W., distant nearly 4 miles.

Berners Bay is a large deep indentation, about  $3\frac{1}{2}$  miles wide at the entrance, which is formed by Point Bridget and Point St. Marys.

It runs in a N NW. direction for 6 miles from Point Bridget, with a width of 3 miles opposite Point St. Marys.

Extensive flats and several large streams make in at the head. At the head of an arm at the NW. end is a small sawmill, and on the eastern side of the bay a reported gold mine. This bay is open to southerly winds, but in fine weather temporary anchorage in 16 to 25 fathoms may be taken at the head and in the SE. bight. The chart is the guide.

Point Sherman lies 4 miles NW. by W.  $\frac{1}{2}$  W. from Point Marys. The coast line between is ragged and should not be approached nearer than  $\frac{1}{2}$  mile particularly off Point Sherman.

Sherman Rock, with only 6 feet of water, lies S SW. from Point Sherman, distant  $\frac{1}{2}$  mile, and a spit with 2 fathoms runs out the same distance W. by N.

The peninsula of which Point St. Marys is the extreme is moderately low and hilly and densely wooded. This low land suddenly terminates about 5 miles above Point Sherman and rises rapidly to the high mountains which, with bare, steep, rocky sides, showing numerous small glaciers in the ravines, form from this point the eastern shore of Lynn Canal. The southern head of this high land has been called the Lions Head, from a fancied resemblance to a recumbent lion.

Sullivan Rock, 150 feet high, and wooded, is  $5\frac{1}{4}$  miles W. of Point Sherman, and is the southernmost of two high-water islets that form the southern end of Sullivan Island.

Sullivan Island is about  $6\frac{1}{2}$  miles long between high-water lines, and  $1\frac{1}{4}$  miles wide. Sullivan Island is about 300 feet high at its southern end, gradually rising to 900 feet, and wooded.

There is a narrow passage to the westward of Sullivan Island, but the steamer track is to the eastward, between it and Eldred Rock, Seduction and Chilkat islands.

Eldred Rock, near the eastern shore of the canal, abreast Sullivan Island and about 3 miles from it, is bare, of small extent, and about 50 feet high; there is a clear passage with deep water on each side of it.

The head of Lynn Canal is divided into two arms by a long peninsula and a narrow chain of several islands. The western arm is called Chilkat Inlet and the eastern arm Chilkoot Inlet, deriving their names from the tribal names of the Indians who inhabit their shores.

The dividing peninsula has a general NW. and SE. direction; it is somewhat hilly and wooded, its greatest elevation being 1,767 feet; its southeastern extreme has been called Seduction Point, and the chain of islands continuing in its axis the Chilkat islands, the southernmost one being called Seduction Island. These islands are moderately high, with a scanty growth of timber. Seduction Island is  $\frac{3}{4}$  mile long and nearly  $\frac{1}{2}$  mile wide, and has an elevation of 220 feet. About 200 yards SE. from its SE. point is a small rocky islet 108 feet high; there are also some projecting ledges, bare at low water. The passage between Seduction Island and the island next above is  $\frac{1}{2}$  mile wide, with  $4\frac{1}{2}$  fathoms water, and is somewhat obstructed by rocky ledges. The island N. of and adjacent to this passage has two knolls E. and W. from each other, connected by a low narrow neck; the E. knoll is 142 feet high. This island is surrounded by rocky ledges, bare at low water. The passage between this and the next island above is  $\frac{1}{2}$  mile wide and 28 fathoms deep. This latter island, the largest of the Chilkat Group, is  $1\frac{1}{2}$  miles long NW. and SE. and  $\frac{1}{4}$  mile wide, and has an elevation of 284 feet. About  $\frac{1}{4}$  mile NW. from its NW. point is a small rocky islet.

The passage between this and the upper island of the Chilkat Group is  $\frac{3}{4}$  mile wide and has a depth of 38 fathoms. This upper one of the Chilkat island is  $\frac{1}{2}$  mile long NW. and SE., is 120 yards wide, and 164 feet high. It lies a little E. from the axis of the group. From its SE. point a ledge, bare at low water, extends about 200 yards. The passage between this island and Point Seduction is clear and has from 30 to 45 fathoms water. From Point Seduction the NW. point of this island lies NE. by E. 1 mile.

From the S. end of Seduction Island bearings have been taken, as follows:

Point Sherman	SE. $\frac{1}{2}$ E.
South end Sullivan Inland, S. W. by W.	$\frac{3}{4}$ W.
Middle of Davidson Glacier	W. by N.
Eldred Rock	SE. by E.

Davidson Glacier, on the west side of the entrance to the Chilkat Inlet, is of considerable extent, coming down from a ravine of the White Mountains and sloping to the water's edge, from which it is separated by a narrow wooded moraine called Glacier Point; shoal water extends a little distance off the moraine, but drops off suddenly to deep water.

## CHILKAT INLET.

From Seduction Island a NW.  $\frac{1}{2}$  W. course leads fairly up to Pyramid Island, 1 mile to the southward of the flats at the head of the navigation of Chilkat Inlet. About 2 miles above Point

Seduction the channel is narrowed to  $\frac{1}{2}$  mile by Glacier Point, the moraine of the Davidson Glacier. On the Seduction side of the inlet the reef makes out  $\frac{1}{4}$  mile, bare at low water. Keep a mid-channel course through these narrows, give the foul ground to the southward of Kochu Island a good berth, and stand up toward Pyramid Island.

**Kochu Island**, 150 feet high and wooded, with some foul ground to the southward, lies about 5 miles **W NW.** of Point Seduction.

**Letnikof Cove** is about  $1\frac{1}{2}$  miles above Kochu Island, with a small islet at its southern entrance point. A cannery is established at the head of this cove, and an indifferent anchorage can be had off the cannery buildings. From the head of Letnikof Cove a wooded flat extends to Flat Bay, on the Chilkoot side of the point; a stream falls into each bay, the two streams heading close together. About 1 mile above the cannery buildings a trail leads across the point.

**Jenkins Rock** lies  $1\frac{1}{4}$  miles **SE.** of Pyramid Island, and  $\frac{1}{4}$  mile off shore; it has 9 feet over it at low water.

**Pyramid Island**, so called from its form, is a small treeless island, grass-grown, and 86 feet high, surrounded by a shelving shingle beach, and connected with the Seduction shore by a spit, bare at low-water spring tides. This island is 1 mile **S.** of the McClellan Flats, and has a roadstead fair-weather anchorage both to the northward and southward of the spit, off the Salmon Canneries.

The geographical position of the island, as determined in 1890, is

Latitude.....	59° 11' 36''.
Longitude.....	135° 26' 46''.

**Pyramid Harbor.**—Anchorage Point bears **S. by E.  $\frac{1}{2}$  E.** from Pyramid Island, and forms the southern entrance to Pyramid Harbor. The northern entrance is formed by Green Point, and the cove, or indentation, though small, is an excellent shelter.

The anchorage is easily found from Anchorage Point, which is a prominent shingle spit, the bed of an old glacier. Anchor in the center of the cove, in 25 fathoms, sticky bottom, off the cannery. No winds blow home here. In summer, with a strong blow during a cross tide, a sea sometimes comes in which makes a vessel lie uneasily at her anchor. The easterly winds in winter sometimes choke this harbor with ice.

**Tides.**—It is high water, full and change, at Pyramid Harbor at 0<sup>h</sup> 30<sup>m</sup>, with a rise and fall of about 16 feet.

About 1 mile above Pyramid Island is the mouth of the Chilkat River, about 2 miles wide, where the McClellan Flats begin. At low water the McClellan Flats for many miles up the river are almost dry, and it is difficult at that time to find even a canoe passage.

Although of no interest to navigation, it is deemed advisable to give a short description of Chilkat River, so far as it is known, from the reports of a Coast Survey party in 1869, and an expedition by the U. S. Navy in 1880, and from other available sources.

About **N.** by **W.** from Pyramid Harbor, across the inlet, is Portage Point, above which is a flat grassy plain with a portage and trail across the head of Seduction Point. About 2 miles **W NW.** from Portage Point is Rancho Point, where the first Indian village is situated, on a grassy wide alluvial flat, having in the background a bold granite peak, which is streaked above by land slides, and wooded below. This village contained 16 houses and about 170 people.

Westward from this village about  $7\frac{1}{2}$  miles the river turns more to the northward around Zimovia Point, where the river is  $1\frac{1}{2}$  miles wide, with not over 2 feet depth in the channel, and for two-thirds the distance from the southern shore is composed of nearly dry flats. At 2 miles from the village precipitous mountains rise 2,000 feet on either side of the valley. The timber gradually changes as the river is ascended, the evergreens giving place to deciduous trees, and those to shrubs at 10 or 15 miles from the river mouth. On the southern side of the river rugged, snow-capped mountain crests are noticeable. About 5 miles from the mouth, on the southern side of the river valley, a river, flowing from a glacier in the mountains to the westward of Davidson Glacier, and possibly connected with it, comes into the Chilkat River through a valley 6 miles long. A little farther up the **Takhin River** comes in from the **W SW.** through a broad valley; this river receives the flow from several glaciers in the mountain range south of the valley, and extends westward about 15 miles.

On the **N.** side of Chilkat River is Vanderbilt Point, about 2 miles above Zimovia Point; beyond the former the flats and sand bars which hitherto have obstructed the river bed give place to numerous low, flat, and wooded islands, with shallow channels between them. The current becomes more rapid as the channel narrows, and runs at times 5 or 6 miles an hour. The width of the stream becomes less, and the direction up stream more northerly.

The next Chilkat village, about 5 miles above Vanderbilt Point, is called Katkwaltu, and contained 11 houses with a population of about 125 people. Here the valley of the river is about 2 miles wide, and the mountains on each side are very steep, and are about 2,500 feet high. A missionary station, called Willard, was located at this village.

About 3 miles above this village the Tsirku River comes in from the southward; it is a small stream, draining a good-sized lake, named Chilkat Lake, lying in the mountains between the Takhin

## CHILKOOT INLET.

River and the Chilkat. About 3 miles farther up on the **N.** bank is the main Chilkat village, called by its inhabitants **Klu-kwan**. It had 65 houses and about 560 inhabitants.

Nearly **W.** from this village is a fine mountain peak, standing alone, about 4,000 feet high, called Chilkat Peak.

Near the village of **Klu-kwan** was the station at which the party of Assistant Davidson, U. S. Coast Survey, observed the total eclipse of the sun in 1869.

Its geographical position is

Latitude .....	59° 23' 41" N.
Longitude .....	135° 53' 30" W.

Large deposits of magnetic iron ore have been discovered, and the precious metals are also known to exist in this vicinity.

The village of **Klu-kwan** may be considered as the head of boat navigation, though small canoes may go somewhat farther. The river is supposed not to rise during freshets more than 2 feet over its September level, which gives rarely over 3 feet in the deepest part of the main channel. There is no map giving these rivers with even sufficient approximate accuracy for description. A few general remarks may, however, be useful.

The **Chilkat River** is a shallow stream about 50 miles in length and running in a general direction to the **E SE.**, and at its mouth is about 2 miles in width, entering the inlet in about latitude 59° 13' **N.** This mouth is so choked with sand bars as to be practically unnavigable for anything except canoes, and the bar at low water appears as if dry clear across. The rise of the tide in the inlet is 16 feet at springs; about 3 miles up the river, at **Zimovia Point**, the rise is reported to be 5 feet, and 2 miles farther up only 1 foot, at the same time when it is 8 feet at the mouth; so that it may be supposed that the stream falls 7 feet in five miles, and, consequently, when not filled with the back water of the tide, must carry but a very small amount of water; and, except at spring freshets, must depend for its flow on the summer melting of some 20 glaciers, the surplus of 4 or 5 small lakes, and the local rainfall of its narrow valleys.

Above the **Katsekahin** the **Chilkat** receives the **Takhin**, and above that the **Tsirku**, all coming in from the southward. About 1 mile above the village of **Klu-kwan** the **Chilkat River** divides into two streams, both heading to the westward. Here they nearly approach branches of a river called **Alsek**, draining the great glaciers on the north side of the **Fairweather Range**.

**Tebienkof** represents the **Alsek River** as running to the southward, cutting through the **Fairweather Range**, and with a delta emptying into the **Pacific Ocean** through what is now known as **Dry Bay**; and by recent explorations this is confirmed.

From the preliminary map of **Dr. Arthur Krause**, who visited this vicinity in 1883, it would appear that from the head waters of the **Chilkat**, a portage across a wide valley is made to the narrower valley of the **Krotahini** branch of the **Alsek** which is ascended to its head, where the **Krotahini Pass** is situated at a height of 5,300 feet above the sea. Descending on the northern side, the head waters of another small branch of the **Alsek** are crossed, and hardly 1 mile beyond this is **Silver Lake**, about 4,000 feet above the sea. From this the declivity is very steep in a short distance, and the stream is fed by many glaciers from a range eastward from the lake. All this drains into the **West Kussua Lake**, a large sheet of water 2,700 feet above the sea. From this point the **West Fork** of the **Kussua River** flows until it joins with the **East Fork** to form the **Lewis River**, by which, in conjunction with the **Pelly**, **McMillan**, and other rivers, the great **Yukon River** of the interior is formed.

The **Chilkat Indians** have for many years been in the habit of making annual visits to the interior as far as **Fort Selkirk**, on the **Yukon**, for purposes of trading. Their description, and a map drawn by the head **Chilkat** chief for the Coast Survey in 1869, differs somewhat from the above description from **Dr. Krause's** map.

The **Indians** make the journey from the **Chilkat** village to **Fort Selkirk** in 30 days, going by boat after crossing the **Chilkat Pass**. The **Chilkat River** rises in a great glacier five days' travel from **Klu-kwan**, and the head waters of a branch of the **Yukon** rise in the same glacier and flow northward. It takes them one day to cross the glacier; numerous lakes are passed, and the latter part of the journey is down the **Tahini River**. They also make the journey over the snow, using snowshoes, with the use of which they are very expert.

The **Chilkat Indians** also make journeys to visit the **Yakutat** villages on the coast. In doing this they descend a river which they call **Alsek**, which comes to the sea at **Dry Bay**.

## CHILKOOT INLET.

On the **NE.** side of the **Point Seduction Peninsula** is **Chilkoot Inlet**, of nearly the same width, but considerably longer than the **Chilkat**, with which it is generally parallel. It derives its name from the tribal name of the **Indians** who inhabit its shores. The eastern shore of the inlet is composed of lofty, steep mountains of the **Chilkat Range**, with several small glaciers in their gorges. These mountains culminate at the north in **Mount Villard**, 3,700 feet high, on the **NW.** side of which is the **Villard Glacier**. The depth of water in mid-channel of **Chilkoot Inlet** is 140 fathoms at the

entrance, about 37 fathoms opposite the mouth of the Katsehin River, and 70 fathoms abreast of Tanani Village.

The usual course into the Chilkoot Inlet is between Point Seduction and the northern Chilkat Island; but there is deep water and a clear channel to the eastward of Eldred Rock and Seduction Island.

Flat Bay, on the western shore, is about 3 miles from Point Seduction; it is a shallow cove of small extent, from which low land extends across the peninsula to Letnikof Cove.

Battery Point, about 3 miles above Flat Bay, is so called from its resemblance to an earthwork fortification. On the eastern shore, opposite Battery Point, is the deep valley and mouth of the Katsehin River; this river is at its mouth filled with a sand-bar, and shoal water extends nearly one-half way to the westward, across the inlet, so that the western shore should be kept well aboard in passing.

From Battery Point Chilkoot Inlet expands to the westward, forming Portage Cove, of considerable extent, on the NW. side of which is situated the Indian village of Deshu; also a mission station called Haines by the Presbyterian Board of Missions. There is also a trading post here. Locally the entire place is known as Chilkoot. A salmon cannery is located on the western side of the cove.

The anchorage is in from 8 to 10 fathoms, 3 or 4 cables off shore, with the trader's store (a small white building northeastward of the large mission building), bearing about W SW. From the anchorage the water shoals gradually to a mud and gravel beach, which, at low water, bares a long distance out. No particular directions are necessary. In heavy southeast weather a more secure anchorage would be found, in deeper water, on the southern side of the bay well inside of Battery Point.

In Portage Bay the winds blow with more or less force about three-quarters of the year.

Tides.—It is high water, full and change, at Portage Cove at 0<sup>h</sup> 37<sup>m</sup>, with an average rise and fall of about 17 feet.

The northern headland of Portage Bay is a low boulder point, rising rapidly to high rounded land. Off the point the water is shoal a good distance out, and the point should not be rounded within less than  $\frac{1}{2}$  mile.

On the W. shore, about 2 miles above Portage Bay, is a small Indian settlement called Tanani Village. The inlet here divides into two arms; one, trending to the westward, is 5 miles long, and receives at its head a short stream which drains the Chilkoot Lake; at the mouth of this stream is a good sized Chilkoot village. Anchorage can be had at the head of the Chilkoot in 25 to 30 fathoms, soft bottom.

Taiya Sahnka, which is formed by the receding of the Ferebee Glacier, lies about 1 mile W. of the peninsula formed by the Taiya and Chilkoot. It is a small harbor with the entrance nearly closed by an old moraine and is at the foot of the Ferebee Valley. The harbor has a narrow entrance, and is about 1 mile long and  $\frac{1}{2}$  mile broad, protected from the southward, but must be well exposed to the winter winds drawing down the Ferebee Glacier.

The northern arm has received the name of Taiya Inlet, and it is by this inlet that the headwaters of the Yukon River are reached by the Chilkoot Pass, which is 4,100 feet high; the distance from tide water to the head waters of the river being about 33 miles.

The entrance to Taiya Inlet is about 3 miles N. by W. from Portage Bay, and the inlet is about 14 miles long in a NNW.  $\frac{1}{2}$  W. direction. Several glacial streams empty into the Taiya, and at its head it receives the waters of a large glacial mountain stream. On the E. side of the inlet, near the head, are two small bights; into the southeastern one enters the Shkagway River. At this point the inlet is very much reduced in width, and at 1 mile above is entirely filled by an extensive flat dry at low water.

An average depth of 230 fathoms is found in mid-channel from the entrance to within 2 miles from the mouth of the Shkagway, where the water shoals to 200 fathoms; a sounding of 72 fathoms was made in mid-channel abreast the outer point of the cove at the mouth of the Shkagway; from this up the water shoals rapidly, and about 1 mile above 15 fathoms is found. The inlet is navigable for ships to a short distance above the mouth of the Shkagway. The shores are steep-to. The cove at the mouth of the Shkagway is narrow, but rather long, with 18 fathoms water. With the ebb tide a vessel may anchor close to the flat, but could not lie there with the flood tide. The winds draw very strong down this inlet.

Indian Rock, the only danger known in the Chilkoot Inlet, lies  $\frac{1}{2}$  mile S. of the Taiya Peninsula. It is a dangerous reef, about  $\frac{1}{2}$  mile long E. and W., with a width of about  $\frac{1}{2}$  mile inside the 3-fathom curve. It has from 3 to 8 feet of water, and at the eastern end is a pinnacle rock, which is awash at low-water spring tides.

To avoid Indian Rock in passing up the Chilkoot keep the western shore aboard at the distance of  $\frac{1}{2}$  mile. Passing up the Taiya, when opposite Portage Cove, cross over to the eastern shore and close it to  $\frac{1}{2}$  mile until up with the waterfall at the mouth of the Taiya, when a mid-channel course can be taken.

The Taiya River at the head of the inlet is navigable for boats and canoes for about 8 miles above the flats. During the ebb tide the current in the river is so strong that boats must be "tracked

up." During flood tide and at high water boats can ascend without difficulty, but must keep in the river channel.

The portage over the pass is usually made over the snow while it is hard; the latter part of April is considered the best time to make the journey.

In 1883 Lieut. Frederick Schwatka, U. S. Army, made a military reconnaissance over the Chilkoot Pass, which he named Perrier Pass, and down the Yukon to its mouth. The head waters of the Yukon had been explored the previous year by the Krause brothers, under direction of the Bremen Geographical Society, and since that time large numbers of miners have every year passed into and out of the Yukon country by that route.

The first expedition of which any record is accessible, and which crossed the divide from the head of the Chilkoot to the Yukon, was that of George Holt, a miner and trader, in August and September, 1875. Five years later a second party crossed, led by Mr. Edmund Bean, a miner and prospector; this was followed by a third party the following year.

#### THE OCEAN COAST FROM CROSS SOUND TO YAKUTAT BAY.

Westward from Cape Spencer the shore trends in a general W. by N. direction for a distance of 40 miles to Lituya Bay.

This shore is bold and rocky, with a few rocky islets close in shore. The shore line appears rather compact, but presents several projecting knobby points with slight open indentations of the coast between.

About 5 miles W. from Cape Spencer and 2 miles off shore are two islands of good size, with numerous surrounding rocks showing kelp in summer; from these, rocks and kelp-patches extend to the northward to the mainland and fringe the shore to Cape Spencer. About 2 miles W. of these islands is a projecting point, unnamed, with outlying islands; to the eastward of this point is a deep bay extending to the northward and from which open three moderately deep coves, the easternmost of which, called **Murphys Cove**, and having a high-water islet at its eastern entrance point, affords a snug anchorage for small vessels; the entrance to the bay and to this cove is to the westward of the first-named islands.

**Astrolabe Point**, about 8 miles W. of these islands, is a narrow, somewhat prominent, wooded point projecting to the S SW., and surrounded by reefs and kelp patches extending well off shore. About 3 miles E. of Astrolabe Point is an arm or bay extending to the northward nearly 4 miles; there is a large island at its eastern entrance point, and nearly in the middle of the bay is a group of small islands; it is not known to possess an anchorage.

Nearly 6 miles westward from Astrolabe Point is a low wooded point, projecting to the southwestward from the foot of a retreating glacier; a bight to the northwestward of the point affords an anchorage. A small inlet extends to the northward 1 mile east of the point; it is filled with rocks and reefs.

**Icy Point** is about 3 miles to the W SW. from this point. A moderately deep bight E. of Icy Point is called **Palma Bay**; it affords an anchorage off a sand beach in 5 fathoms, sand and mud, and is protected from the sea by the projecting point.

Icy Point is rather low, wooded, and rising to a rounded dome toward its summit, which is formed by the termination of a ridge extending to the southward from Mount La Perouse, E. of the La Perouse glacier. No surveys have been made in this vicinity. From 6 to 10 miles off shore Palma Bay appears quite open, with a knob or islet in its northern part. About 7½ miles SW. from Icy Point the U. S. Coast Survey sounded in 110 fathoms, soft muddy bottom.

Immediately behind the shore line up to this point is the eastern portion of the St. Elias Range of mountains, and which extend westward nearly to the Copper River, and include the highest mountain peaks yet known on the North American Continent. This eastern portion of the range is sometimes known as the Fairweather Range.

The sides of these mountains, toward the sea, bear numerous glaciers, some of great extent, and a few reaching even to the sea.

North of the St. Elias Range is supposed to be a great sea of ice.

Among the glaciers that reach the sea is the **La Perouse Glacier**, which has its névé situated on a saddle of the range, some 8,000 feet above the sea, nearly N. from Icy Point. From this it descends very rapidly during the first 3 miles, forming a veritable ice cascade at one spot, where a black island of rock projects through it. For the remaining 5 or 6 miles of its length the slope is much more gradual, and a number of branches are received, from which are derived a number of lateral moraines. Near the sea it joins the foot of the great **Crillon Glacier**, and ceases just at the beach, behind which its foot is seen, black with mud, and covered with stones and fragments of rock, and is about 2 miles in width. The hills on either side of it are wooded. The mountains themselves are snow covered, or exhibit bare rock faces without vegetation, and present a spectacle of great grandeur.

**Mount La Perouse**, on the flank of which this glacier is situated, is in, approximately,

Latitude .....	58° 34' N.
Longitude .....	137° 00' W.

and from observations by the Coast Survey in 1874, is believed to reach a height of about 11,000 feet. Its apex inclines somewhat toward the **SE.**, and is the highest crag of a massive and irregular uplift rather than an isolated peak. It is distinctly visible from Icy Strait, and from many miles away to the **SE.** The ridge of which it is one of the most conspicuous elevations here trends to the **NW.** for more than 6 miles.

**Mount Dagelet**, on the **NW.** side of the saddle from which the **La Perouse Glacier** takes its start, is a small, sharp, conical, ragged crag, about 9,000 feet in height, 4 miles **NW.** from which is **Mount Crillon**, rising to a height of 15,900 feet, and presenting from some points of view a sharp and pretty regular cone, while from others it appears merely as the most elevated part of a long sharp ridge. The foot of this ridge is buried beneath the foot of an immense glacier, which extends in a direction directly transverse to the main axis of the glacier. One part extends **E SE.** and merges with the foot of the **La Perouse Glacier**, the other in a westerly direction to the **NE.** extreme of **Lituya Bay**. South of it, between **Lituya Bay** and the foot of **La Perouse Glacier**, is a range of low, densely wooded hills, with some level land to seaward of them. This low land increases in width to the westward and forms the **E.** side of **Lituya Bay**, the shore line trending from the glacier to the **W.** by **S.** 16 miles to Harbor Point at the entrance to the bay. This is the **SW.** point of the low land above mentioned, which from the **E.** and **SE.** appears like a long low point with some slight elevations on it.

From the southward, Harbor Point is inconspicuous, but may be readily recognized by two small mammilated hills, densely wooded, which lie behind it **N.** by **E.** and **N NE.**, and have been called **The Paps.**

**Harbor Point** is the eastern point of entrance to a remarkable bay named by the Russians **Lituya Bay**. It was visited and examined by the U. S. Coast Survey in 1874, though it had been visited by and was well known to many of the early navigators.

**Lituya Bay** extends from its entrance at Harbor Point, about 6 miles in a **NE.** by **N.**  $\frac{1}{4}$  **N.** direction, with a width varying from  $\frac{3}{4}$  mile to  $1\frac{1}{2}$  miles. At the head of the bay are two arms, each about  $\frac{3}{4}$  mile wide, of which the western one trends **NW.** by **W.**  $\frac{1}{4}$  **W.** for 4 miles, and the other one about **E.** by **S.** the same distance. The bay is, therefore, nearly **T-shaped**. The entrance to the bay would naturally be about 1 mile wide, but it is in fact nearly closed by spits extending from the original shores.

From the western angle of Harbor Point, the eastern point of entrance, the spit is short, composed of shingle, large boulders, and rocks, probably originally brought down by floating ice from the upper part of the bay. The spit extends **SW.** 1 cable from the extreme end of the point, and is nearly all bare at low water, and bold-to, except in one spot. There are several high boulders that must be bare at all times; the largest one of these, on the extreme southern edge of the spit, is called **Cormcrant Rock**.

From **Cormorant Rock W NW.**  $\frac{1}{2}$  **W.** 200 yards is **Passage Rock**, a submerged rock, and the only one noted on the **E.** side of the passage by the Coast Survey party in 1874. It is a single boulder with 6 fathoms alongside of it. Between this rock and the danger line of the **W.** side, **SW.** from it, is the narrowest part of the entrance which here does not exceed 300 yards, and carries from 4 to 6 fathoms at low water.

From the western high headland of the bay extends a long spit about  $\frac{1}{4}$  mile in a **SE.** by **S.** direction, thence curving to the **E SE.** for  $\frac{1}{2}$  mile farther to high-water mark, from which to low-water mark a stretch of boulders and shingle extend 2 cables **SE.** by **S.**

Beyond this is an area covered with 1 to 3 fathoms at low water, which extends in a **SE.** by **S.** direction about  $\frac{1}{4}$  mile, and is strewed here and there with large boulders, of which the tops in a few cases dry at low water. The margin of the **W.** side of the channel, unlike that of the **E.** side, has no distinct boundary, but rapidly shoals to 6 feet at low water, over a bottom strewn with large boulders, mostly visible from aloft at low water, though not dry. This bank of boulders and shingle extends clear around the low **W.** entrance point, with an average width of 1 cable, but is narrower just within the entrance.

The spit, rising 2 to 12 feet above high-water mark, is nearly level. About half of it is grassy, the remainder composed of bare boulders. On the western grassy part are two small clumps of low spruce trees. Near the southeastern clump was situated the astronomical station of the Coast Survey party in 1874, placing it in

Latitude .....	58° 36' 57'' N.,
Longitude .....	137° 40' 05'' W.

The variation observed was 30° 13' **E.** In 1786 the variation was 28° **E.** It is now supposed to be decreasing about 1° annually.

**Tides.**—The range of the tides observed here by the Coast Survey party for about 4 days was 6 feet. **La Perouse** observed  $7\frac{1}{2}$  feet range at full and change, and it was high water 1 hour after the moon's passage.

In the bay, northward from the middle of the western spit, is **Anchorage Cove**, about  $\frac{1}{4}$  mile in extent, and is a convenient anchorage in 5 to 7 fathoms over a hard sandy bottom. Between this



## LITUYA BAY—DIRECTIONS.

anchorage and the entrance to the bay the depth is from 5 to 7 fathoms. On the eastern side just within the entrance is a shallow bight, back of which is a small fresh-water lake. There are no permanent inhabitants at this bay.

From outside the entrance of the bay, looking north into it, there are visible—a flat spit in front; to the **NNE**. **The Paps**, rising out of densely wooded lowlands; to the **NNW**. similar lowlands with small irregular hills rising inland. At a distance of 4 or 5 miles on the **W**. shore of the bay rises a precipitous rocky face to the height of several thousand feet; this is marked by a curious line or break in the rock, which is also visible in the topography westward from the precipice, which, from the middle of the rocky wall, dips to the **WSW**. at an angle of about 5 degrees. Behind this cliff, and dwarfing it, rises, beyond the arms at the head of the bay, the magnificent range which culminates in the peaks of Crillon and Lituya. Down its precipitous slopes 5 or 6 glaciers fall in three ice cascades to the water's edge. Opposite this rocky precipice is another mountain, more rounded and less high; between these two is the gate to the two arms forming the upper bay.

The shores of the arms are bold and precipitous; a large glacier occupies the head of each arm; that to the eastward is the foot of the Crillon Glacier. Except at the entrance, the entire waters of the bay are deep and afford no anchorage, except as noted. It is believed that the entire bay freezes over in winter.

About  $2\frac{3}{4}$  miles **NNE**. from the entrance, and nearly in the middle of the bay, is Cenotaph Island; it is about  $\frac{3}{4}$  mile long and  $\frac{1}{2}$  mile wide, and about 100 feet high; it is steep-to except on its **N**. side. On this island La Perouse erected a monument or cenotaph to the memory of his officers and men who were lost in the bore at the entrance to the bay in 1786. No trace of this could be discovered in 1874.

At the narrow entrance to the bay, in rough weather, except at slack water, the breakers extend entirely across, and in moderate weather there are breakers on both spits. Slack water varies in length from 20 minutes to 2 hours, according to the character of the tide, which is complex, and the direction of the wind.

In perfectly calm weather the incoming tide shows a bore of considerable magnitude, and the same is true with the first part of the ebb, especially when the wind is from the southward. It is only practicable and safe to pass through the entrance at slack water. Once in the tideway the vessel is carried through instantly, as if sailing down hill. The narrow part of the entrance is only about 1 cable in length, beyond which there is no danger.

The entrance to the bay is easily distinguished. On the **E**. side of the bay **The Paps** form an excellent landmark.

## DIRECTIONS FOR LITUYA BAY.

**To enter.**—When off the entrance bring the easternmost rounded, low, woody hill on the **W**. side of the bay to bear **NNW**., and steer that as a course until within the entrance about 2 cables, when the course will be about **WNW**. to the anchorage in the middle of the cove, with the eastern clump of trees on the spit bearing **SW**. by **W**. No attempt should be made to enter with a steamer, except at slack water, and sailing vessels are recommended to wait for slack water of ebb tide.

**To Leave the Bay.**—Take the end of an ebb, or the slack water immediately after high water, and steer **SSE**. to pass one-third of the way from Cormorant Rock toward the breaker off the long western spit.\* About  $\frac{3}{4}$  mile **S**. by **W**.  $\frac{1}{2}$  **W**. from the entrance the Coast Survey sounded in 25 fathoms.

**Huagin River**,  $2\frac{1}{2}$  miles **NW**.  $\frac{1}{2}$  **W**. from Lituya Bay, is a glacial stream that affords good fishing for the natives.

About 16 miles to the **NW**. by **W**. from Harbor Point is Cape Fairweather; between the two the coast curves inward slightly, forming a shallow bight with a shore composed of boulders, the narrow strip of land between it and the foot of the mountains being densely wooded.

**Cape Fairweather** is an evenly rounded point, with an elevation behind it, sloping gently to the sea and abruptly to the mountains. The summit of the cape is bare of vegetation, and is covered with large heaps of glacial drift piled irregularly, some of it of a bright iron-rust red color. Water runs through the beach in several places, and it is not improbable that underneath this debris there may still exist large masses of ice.

**Mount Fairweather** bears from Cape Fairweather **NE**.  $\frac{1}{4}$  **N**., distant about 13 miles. It is one of the most remarkable of the peaks of the St. Elias Range. This mountain, seen from the **SW**., shows a middle angular summit, with a high shoulder on each side of it; these send down three high ridges with glaciers between them. **SE**. from them is a deep sinuous valley, which is quite filled by a large glacier. Westward the range is much broken, and is considerably lower. Mount Fairweather is wooded to the height of about 4,000 feet. According to the observations of the Coast Survey party in 1874, Mount Fairweather is 15,500 high, with an uncertainty of about 150 feet, and is situated in

Latitude .....	58° 54' 24" N.
Longitude .....	137° 30' 59" W.

\* These directions are given by the Coast Survey party who entered the bay in 1874.





WNW

Cape Fairweather from Lituya Heads

(From a sketch by Asst. Dall in 1874.)



NNW

N

Lituya Mt.

NNE

Entrance, Lituya Bay.

(From a sketch by Asst. Dall in 1874.)  
(Telescopic view.)

Between it and Cape Spencer the peaks of the St. Elias Range are as follows: First, a small, double peak; second, Lituya Peak; third, a small, single peak; fourth, Mount Crillon; fifth, Mount La Perouse, high and split at the top; sixth and last, a small single peak.

There are, of course, numerous other summits, but the ones noted are those which rise above the general summit of the range. These peaks are generally known as the Fairweather Range.

Westward from Cape Fairweather to Yakutat Bay there are no particularly remarkable peaks, the range averaging from 5,000 to 8,000 feet in height, with nearly uniform summits and rugged surfaces.

Soundings at 5 miles off shore, parallel to the coast line between Lituya Bay and Cape Fairweather, give depths of from 43 to 65 fathoms.

From Cape Fairweather the shore turns to the northward for some 4 miles, to a point where the Fairweather Range sends a spur to the water's edge; just beyond this is a valley filled by a good sized glacier, separated from the sea by a wooded bank about 40 feet high, through which several glacial streams cut their way. In the same valley, farther up the mountain, is another small glacier. Westward of this valley another ridge or spur comes down to the sea; these ridges are all wooded.

From the first spur mentioned the shore line trends to the westward for 20 miles, forming a broad, open bay, with soundings of 20 to 50 fathoms over a smooth, muddy bottom. Beyond the second spur is the seaward face of an immense glacier, 3 or 4 miles in width at the sea, and extending back many miles over a high crest of the Fairweather Range. In front of the glacier is a narrow, wooded bank about 50 feet high; the middle part of this moraine, opposite the axis of the glacier, is grassy and bare of trees; several small streams cut through it.

On the west side of this great glacier a spur of the mountains comes down to the sea. This spur rises to about 3,000 feet, with rounded outlines, well wooded below and grassy above. Near the beach are some abrupt cliffs, intersected by a deep gorge, with a stream in it, with a higher, rocky, and partly snow-covered mountain behind the head of the gorge. Off the foot of the cliffs immense boulders line the beach, extending well out to seaward.

From this spur, which trends in a general northerly direction from the sea, a low ridge branches out in a westerly direction for 2 or 3 miles, with a gradual seaward slope to the level of a low, flat, wooded plain, a strip of which intervenes between the ridge and the sea.

Northward and westward from this ridge is Dry Bay. At a comparatively short distance off shore the plain is below the horizon; the spur east of it appears like a projecting point, and a solitary knob hill in the plain appears like an island, while the mountain range behind fulfills the similitude of a bay with an island in it.

Dry Bay is in reality the delta of the Alsek River, which here breaks through the mountains and drains the great glacial sea on the north side of the St. Elias Range. The river enters the bay by three separate mouths, into which it breaks after cutting through the mountains on the W. side of the large glacier lying N. of the bay. On the N. side of the St. Elias Range the Alsek River heads to the northward, to its headwaters in the mountains of the Chilkat Pass; a branch heads to the westward along the foot of the north side of the range. Both branches are made use of by the Indians on their hunting trips; the northern branch is the route traveled by the Indians going to and from the Chilkat country. The current of the river is very strong.

The great volume of fresh water entering Dry Bay is sufficient to render the waters of the bay very fresh; the bay is a large open sheet of water of considerable depth; it has several outlets to the sea; the easternmost of these, lying under the projecting ridge on the E. side of the bay, being the largest; this entrance is guarded by a bar over which 6 feet can be carried at low water; it should not be attempted, however, without local knowledge. Within this entrance, on the N. side of the projecting ridge, is a large Indian village, off which is a good anchorage. Dry Bay is a noted resort for salmon during the season. The details of the navigation of the bay are very little known; there are several islands in the bay, one of them being the solitary knob hill before mentioned; it lies between the middle and western mouths of the Alsek River.

The sea in this vicinity is usually of a milky white color, due to the excessive outpouring of the glacial waters.

Some miles W. of Dry Bay another large stream enters the sea over a well marked bar; it may also be an outlet of Dry Bay; its entrance is indicated by a small bluff or dune on the W. bank, at the mouth of the stream; this is higher than any elevation on the shore of this flat, and even plain.

From this dune or bank the shore extends in a westerly direction about 45 miles to Ocean Cape, the eastern entrance point to the Bay of Yakutat.

This stretch of shore appears to be thickly wooded near the sea, with more open spaces inland, and is reported as being a "fine country" with a rich alluvial soil covered by a rich verdure. The mountains which bound it to the northward, at a distance of 7 to 10 miles from the sea, carry numerous glaciers. The westernmost of these, lying just east of a huge projecting spur, about 25 miles E. of Yakutat, is, from its appearance, the most noticeable. It is 2 or 3 miles wide and extends back as far as the eye can reach at an elevation of not over 200 feet, resembling a vast frozen river; there are no mountains visible to the N. of it. In front of it is a fringe of low wooded land. *This is without*

doubt the *Grand Plateau Glacier of La Perouse*. Near the foot of this great glacier is a good sized river, which it is said can be entered by small vessels. It is asserted that the great plain fronting the St. Elias Range is so intersected by glacial streams as to form, with the aid of short portages, a complete system of inland boat navigation.

Westward from the *Grand Plateau Glacier* the mountains recede toward the head of Yakutat Bay, fronted by a moderately low country heavily wooded.

Ocean Cape, which terminates the southwestern extreme of this low land, is the southern angle of a broad faced head extending to the westward, called Cape Phipps, its northern angle being called Point Carrew. Ocean Cape is a low bank, or gravel bluff, about 50 feet high, nearly perpendicular toward the sea, and sloping rapidly northward; in front of it is a shingle beach; to the eastward are also several steep, bare, bluffs. Several rocks marked by kelp extend off southward from the cape. In rough weather there are heavy breakers extending  $\frac{1}{2}$  mile off shore on both sides of the cape, and at a distance of 2 miles S. of it there is only 13 fathoms of water, over a sandy bottom, and it should be approached with caution; the land behind the cape is quite thickly wooded with spruce trees.

Point Manby, the western entrance point of Yakutat Bay, lies about 18 miles nearly WNW. from Ocean Cape. This point appears low at the water's edge, with a few willows near the shore, immediately behind which is a hill or bluff, flat on top, rising abruptly, and composed of glacial debris.

Yakutat Bay, entering between Ocean Cape and Point Manby, is a deep indentation of the shore about 20 miles long, N. and S., and 10 or 12 miles wide, with a probable depth of less than 100 fathoms. The land on both sides of the bay for two-thirds its length is moderately low; the flanks of its mountains are only reached near its northern part. The western shore is compact, and, so far as known, has not more than one small island, near the mouth of a considerable stream which flows in at the base of the foot hills of the St. Elias Range. The eastern shore is lower, with a number of islands bordering it, among which are several anchorages.

From Ocean Cape the shore rounds to the northward about  $2\frac{1}{2}$  miles to Point Carrew; it is composed of the gravel bluffs before referred to, off which rocky shoals and reefs extend at least 1 mile, marked by breakers in most weather. From Point Carrew the foul ground extends even farther to the westward.

From Point Carrew the shore trends nearly E. for about  $4\frac{1}{2}$  miles, thence turns generally to the northward to the head of Yakutat Bay; in the angle thus formed is a compact group of large islands, the largest and westernmost being called **Khantaak Island**; the waters S. and E. of the group has been called **De Monti Bay**. About  $1\frac{1}{2}$  miles E. of the point is the entrance to **Ankau Creek**; this stream is about 2 cables wide at its mouth, with a depth near the entrance variously stated at from 9 to 18 feet at low water. The creek is very tortuous, with numerous islands, passages, etc.; it has never been surveyed. The depth is from 1 to 6 fathoms; in many places, at certain stages of the tide, there are overfalls, whirls, and dangerous eddies. The creek can only be entered at slack water, or with the tide; its waters extend nearly to the beach eastward of Ocean Cape. **Ankau Creek** is the outlet of several lakes, one large one lying about 10 miles to the NE. of Ocean Cape. It is said that salmon may be caught in these waters during the entire year. At its eastern end **Ankau Creek** connects by a low short portage with the inland system of navigation leading to Dry Bay.

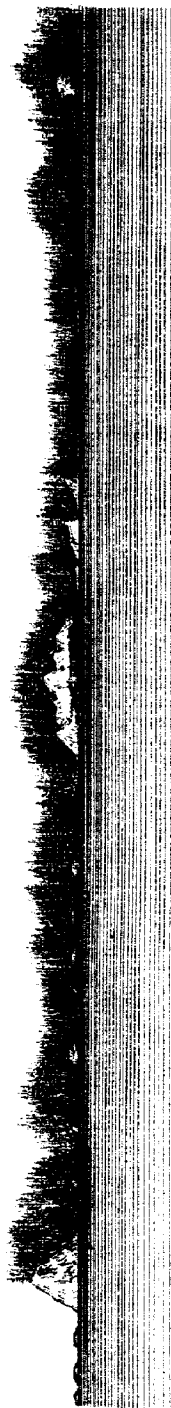
The eastern part of **De Monti Bay** forms a round cove about  $\frac{1}{2}$  mile deep; on the NW. point of this cove are several houses, and also a trading store; the only anchorage is on the S. side of the cove, with the trading store bearing about N.; it is under a moderately high bluff, near a gravel beach, in about 17 fathoms of water, and 1 cable off shore; it is not a particularly desirable anchorage, though the holding ground is good.

From Point Carrew, SW. point of **Khantaak Island** bears about N.  $\frac{1}{2}$  E., distant  $1\frac{1}{2}$  miles; in mid-channel between these points the Coast Survey sounded in 80 fathoms. Point Turner, the SE. point of the island, bears NE. by E. 2 miles from Point Carrew.

Point Turner is a low, narrow, gravel spit,  $\frac{1}{2}$  mile in length, the eastern part being grassy and bare of trees. S. from the point the water is shoal, having only 3 fathoms at low water at a distance out of nearly  $\frac{1}{2}$  mile, and off the point numerous boulders show at low water. Except on the outer end of Point Turner, **Khantaak Island** is heavily wooded. It is generally low and nearly level, rising 40 or 50 feet above the sea, highest to the SW., and gradually falling in the opposite direction.

**Khantaak Island** is about 7 miles long in a N. and S. direction, and in general not over 1 mile in width. It is very compact on its western shore, but quite irregular on its eastern side. The former is slightly indented, with a few visible rocks near it, shoaling off gradually, with a boulder bottom of 3 to 5 fathoms for nearly  $\frac{1}{2}$  mile off shore, and it should be approached with caution.

The waters between **Khantaak Island** and the main shore, eastward from it, are much obstructed by shoals and rocks. Among these are several snug anchorages. The most accessible of these lies N. of Point Turner, and is called **Port Mulgrave**; it is about  $\frac{1}{2}$  mile long NW. by W.  $\frac{1}{2}$  W. and SE. by E.  $\frac{1}{2}$  E., and  $\frac{1}{2}$  mile wide, reduced at low water, however, to nearly half that width. It is easy of entrance, though the passage is very narrow, being but 70 yards wide at low water, but with not less



Ocean Cape, entrance to Yakutat, N.N.W. (mag) 7 Miles

than  $7\frac{1}{2}$  fathoms of water. The anchorage is in about 9 fathoms, muddy bottom; the depth in the bay is from 7 to 12 fathoms at low water.

Port Mulgrave is formed by the peninsula of Point Turner on the S., and on the N. by a series of shoals or boulder reefs, extending nearly parallel with that peninsula, and mostly visible at extreme low water. The head of the port is a narrow, shallow bight, NNE. from which is a projection of Khantaak Island, the head of which, about 2 cables wide, faces to the SE. From this face the Northwest Shoal extends in a SE. by E. direction nearly  $\frac{1}{2}$  mile, narrowing as it goes; most of this shoal shows at ordinary low water, and the highest portions are only awash, with a few dry points, at high water.

Middle Shoal, separated from the eastern extreme of Point Turner by only 70 yards at low water, is about 1 cable long NW. and SE., and half that width; it is entirely covered at high water. Both the southern edge of this shoal and the northern edge of Point Turner opposite are very steep to at low water, so that the narrowness of the passage does not constitute a serious danger. Between the Middle and Northwest shoals the water is about 3 feet deep at low water.

The Southeastern Shoal lies E.  $\frac{1}{2}$  N.  $\frac{3}{8}$  mile from the extreme of Point Turner. Except at extreme high tides, a triangular part of this shoal, which dries about 1 cable long, is marked at its northern and southern angles by some small boulders above water; these, in calm weather, at high water, have the appearance of ducks sitting in the water. From this dry triangular bank a long, narrow, submerged ridge extends in a westerly direction from the southern angle of the bank, directly toward Point Turner, from which it is separated about 250 yards at low water; the extreme western end of this ridge is only a few yards wide, and has 11 feet over it at low water, with 5 fathoms close to.

Between the Middle and Southeastern Shoals is a narrow and rather crooked passage, with from 4 to 8 fathoms of water. Between the shoal and the mainland to the eastward, however, is a broad straight passage with from 10 to 20 fathoms.

About the middle of Point Turner Peninsula is a narrow lagoon of nearly stagnant water, between which and the beach N. of it is the Yakutat Indian village of about 8 rather inferior houses, in which live about 100 Indians; these houses are usually vacant in summer, when the people are away for salmon fishing and seal hunting. On Khantaak Island are 10 or 12 small lakes.

Immediately W. of the village the timber begins. In 1888 this vicinity was the scene of some excitement, owing to a report that gold placer mines existed there, and many miners found their way there. Some gold was found, but the place was soon abandoned as a mining camp.

#### DIRECTIONS FOR PORT MULGRAVE.

Give Ocean Cape and Point Carrew a berth of at least 1 mile, and enter in mid-channel between Point Carrew and Southwest Point, steering E. until Point Turner bears N. by W., when steer N.  $\frac{1}{2}$  W., rounding in as the passage between Point Turner and Middle Shoal opens. At low water it is not possible for a vessel to ground on the Point Turner side on account of the steepness of the bank.

For a stranger, low water is the most convenient time for entering, as the shoals are all above water at that time, though with ordinary care the port may be entered or left at any time.

The usual anchorage is off the Indian village, in 9 or 10 fathoms, with Point Turner bearing about ESE. This anchorage is not suitable for large vessels.

The Coast Survey astronomical station was established near the extreme end of Point Turner. It was determined to be in

Latitude .....	59° 33' 42" N.
Longitude .....	139° 45' 53" W.

The variation in 1880 was 29° 56' E. The tides have not been observed here, except by the Russians; but the range is about 8 feet in May, June, and July, being sometimes much increased in October and November. On the Russian chart of Port Mulgrave the establishment is given as 0<sup>h</sup> 43<sup>m</sup>, with a rise and fall of nearly 8 feet, which is probably correct.

The NW. shoal and the point of land from which it projects separates Port Mulgrave from a similar bight to the northward and westward, to which the name Rurik Harbor has been given. The Russian map indicates an entrance about 2 cables wide between the NW. shoal and Piedras Point, from which latter a reef of rocks borders a similar shoal on the N. side of the entrance. There appears to be a bar at the entrance with from 4 to 9 fathoms, deepening inside to from 10 to 24 fathoms.

Rurik Harbor appears to have no advantages over Port Mulgrave, and the entrance is more complicated.

A third similar, though somewhat larger bight, with much deeper water, lies N. of Point Piedras. East of the line of shoals that border Port Mulgrave is a broad expanse of water from 10 to 30 fathoms deep, in almost any part of which a vessel might anchor, if necessary. On the N. side of this is a group of wooded islands, divided by rocky passages, separating the N. end of Khantaak Island from the mainland to the eastward. In the NE. part of this broad expanse of water a narrow passage leads between the two northern of three small islets into the broader passage called

Johnstone Passage, which separates the Khantaak group from the mainland. Seven fathoms appear to be the least water in the narrow passage between the two northern islets, while in the broader passage S. of the middle islet only 9 feet can be carried.

In the main shore, SE. of the three islets above mentioned, is a small, snug cove, called Puget Cove, affording good anchorage in about 7 fathoms, but it is too difficult of access to be of any great use.

From the entrance to Puget Cove, Johnstone Passage, between the mainland and Khantaak group, trends in a general N NW. direction, with a width of about  $\frac{1}{2}$  mile for nearly 4 miles, when it turns more to the westward, contracts for a short distance, and then expands into a basin about 1 mile in extent, having from 25 to 30 fathoms of water, its eastern boundary being a narrow, irregular projection of the mainland called Hatchet Point. The end of this point is low and separated by a narrow 14-foot channel from a group of islets and rocks, of which the largest, nearly 2 miles long, half-moon shaped and convex to the N NE., is named Dolgoi Island; this island is bold-to on its eastern and northern shores, off which are two low islands.

On the western side of the Dolgoi Group, and between it and the northern part of the Khantaak Group, Johnstone Passage continues about 3 miles in a general N NW. direction, its width varying from 2 cables to more than 1 mile. The passage is deep, but a sounding of 4 fathoms appears just off the NW. point of the Dolgoi group of islands. To the N. and W. of Dolgoi Island are 3 islands called, respectively, from the southward, Krivoi, Otmeloi, and Krutoi; the middle one, being but little more than a sand bank, extending about 1 mile N. by W. from its highest point.

On the E. side of Hatchet Point is a bay, about 1 mile in extent, unsurveyed; and on the mainland NE. by E. from Dolgoi Island is a bight which also might afford an anchorage.

The northern extreme of Khantaak Island, called NE. Point, lies about  $1\frac{1}{2}$  miles NW. by W.  $\frac{1}{2}$  W. from the NW. end of Dolgoi Island. The western shore of Khantaak Island is shoal for some distance out, while the eastern shore, above the Dolgoi Group, is bold, and apparently free from dangers.

The main shore of Yakutat Bay, to the eastward of Dolgoi Island, extends about  $5\frac{1}{2}$  miles in a N.  $\frac{1}{2}$  W. direction to Eleanor Cove, off which is a large island called Knight Island; the anchorage ground is in a small inner cove, in which is a small islet or rock. No soundings are given in this vicinity. The passage E. of Knight Island is navigable. About 1 mile S. of Eleanor Cove a long shoal makes out to the NW. from the main shore about 1 mile. But little is known of this vicinity.

From Knight Island the coast extends about 7 miles W. to a bluff point called Point Latouche. Up to this point the shores are low and flat, with 45 fathoms less than 1 mile off shore.

West from Point Latouche, on the western side of Yakutat Bay, is another sharp bluff, which, 2 miles to the northward, terminates in a somewhat lower point.

The entrance between these points is called Ferrer Passage, and leads to Disenchantment Bay, a large inlet at the extreme head of Yakutat Bay.

Disenchantment Bay, from its entrance at Point Latouche, curves to the southward and eastward, and from a large, bare, rocky islet called Bare Rock, lying in mid-channel near Point Latouche, is about 35 miles in length. From the flanks of the St. Elias Range four glaciers enter this bay on its N. side; at the foot of the moraine of the third and fourth glacier anchorage may be found in 10 to 15 fathoms. N. of a projecting point of the S. shore, near Bare Rock, is Egg Island, inside of which may be found an anchorage in 6 fathoms; the bight in the S. shore a couple of miles E. of Egg Island also affords an anchorage. Off the Indian camping ground, just N. of Point Latouche, anchorage in 20 fathoms may be found off the sand beach about 2 cables off shore.

The entrance to Disenchantment Bay is usually filled with floating ice. The channel lies on the E. side of Bare Rock. Other anchorages than those noted may be found on the N. side of the bay in the vicinity of the fourth glacier. Extensive deposits of excellent coal have been located on the N. side of the bay. The head of Disenchantment Bay is 25 miles from Ankau Creek by an easy trail over the mountain through the open forest.

S. and W. from the western point of entrance to Disenchantment Bay the NW. shore of Yakutat Bay stretches along in the form of an abrupt bluff, with but little or no beach. In a deep valley some distance from the head of the bay the Kwik River comes in. About half way between this river and Point Manby is a slight projecting point; in this vicinity the U. S. Coast Survey party, in 1880, observed that the immediate shore was low, and largely composed of granite and boulder; it shoals off quite gradually, with a bottom of large stones with a little sand among them; on the stones giant kelp grew profusely. At more than 1 mile from shore the depth was only 10 fathoms, and an occasional heavy swell showed that in places it was even less.

At Point Manby, and eastward to the Kwik River, the shore was bordered by light trees, with a somewhat denser belt farther back. Behind this rises a bank or bluff of high land, irregularly wooded, as described by various navigators.

The bluff or table land rises higher than the river valley, and completely hides it from the southward, and is in summer completely bare of vegetation, except a few rare patches on its face, and apparently is composed of glacial debris, much of which is of a reddish color.

Within the beach and extending in a NW. direction to the valley behind it at the foot of Mount St. Elias and westward to Icy Bay, this table land or plateau is one great field of buried ice. Between

Disenchantment Bay and the foot of Mount St. Elias, the U. S. Coast Survey party in 1880 counted 17 glaciers, ten of which were behind this plateau; none of them were of very great size; the lower ends of these small glaciers come down into the valley of the Kwik River, and in general at right angles to the trend of the plateau. To the great buried glacier the U. S. Coast Survey has applied the name Malaspina Plateau.

Everywhere on the plateau, except where the ice pinnacles protruded, and a few spots on the face of the bluff, it is covered with a thick stratum of soil, stones, and gravel, here and there showing patches of bright green herbage.

From Port Mulgrave, and thence to the westward, the most conspicuous spectacle in clear weather is that part of the uplift of the St. Elias Range which extends westward from the line of Disenchantment Bay. This forms a broken range 10,000 or 12,000 feet high, with its sides and many of its peaks covered with eternal snow, and terminating westward in the magnificent peak of Mount St. Elias.

Out of the St. Elias Range, about  $N\ NW. \frac{1}{2} W.$  from Port Mulgrave, rises a peak about 13,000 feet high, with three glaciers on its flanks, called by the Coast Survey Mount Vancouver. Farther westward,  $NW. \frac{1}{2} W.$  from Port Mulgrave, is another peak named at the same time Mount Cook.

Observations by the U. S. Coast Survey in 1874 on Mount St. Elias give it a height of 19,500 feet, with a probable error of less than 500 feet, and determined its geographical position to be in

Latitude .....	60° 20' 45" N.
Longitude .....	141° 00' 12" W.

The mountain has often been seen at more than 150 miles distance.

Several attempts have been made to ascend Mount St. Elias; the first, in 1886, reached a height of 7,000 feet and the party were then obliged to turn back. An expedition in 1888 reached a height of 11,000 feet. All these attempts were made from the S. side of the mountain.

The latest expedition is that of 1891. The leader of this expedition, Professor I. C. Russell, determined, by triangulation, the height of Mt. St. Elias to be 18,100 feet.

#### PAMPLONA ROCK.

Although not coming within the limit of this work, it is deemed proper to note such information as is available regarding this danger, the position of which, and indeed its existence, is still undetermined.

It was first discovered or reported in 1779 by a Spanish expedition, by which it was placed in

Latitude .....	59° 02' N.
Longitude .....	145° 32' W.

It was again reported in 1794, but its position was not determined.

On chart No. 3 of Galiano's Atlas, a Pamplona Bank is given in

Latitude .....	59° 07' N.
Longitude .....	142° 41' W., approximate.

Vancouver's paraphrase of Puget's report to him in regard to the vicinity of Port Mulgrave contains the following remarks in regard to it: "Portoff said that a very dangerous rocky shoal about 15 miles in length lies, by compass, in a direction S. by W. 63 miles from a place called by them Leda-unala. This Puget conceived to be near the point that I had called Point Riou. \* \* \* From the Spaniards, also, I afterward became acquainted that a very dangerous rock existed in this neighborhood, the situation of which they had taken great pains to ascertain, and had found it to lie S. 41° E. from Cape Suckling, at the distance of 26 leagues, and which was called by them Roca Pamplona."

The above, and much more conflicting evidence exists regarding this rock or shoal.

It has been searched for, without success, on several occasions. In 1867 the U. S. Revenue Steamer *Lincoln* sounded in 180 fathoms without bottom in

Latitude .....	59° 12' N.
Longitude .....	143° 05' W.

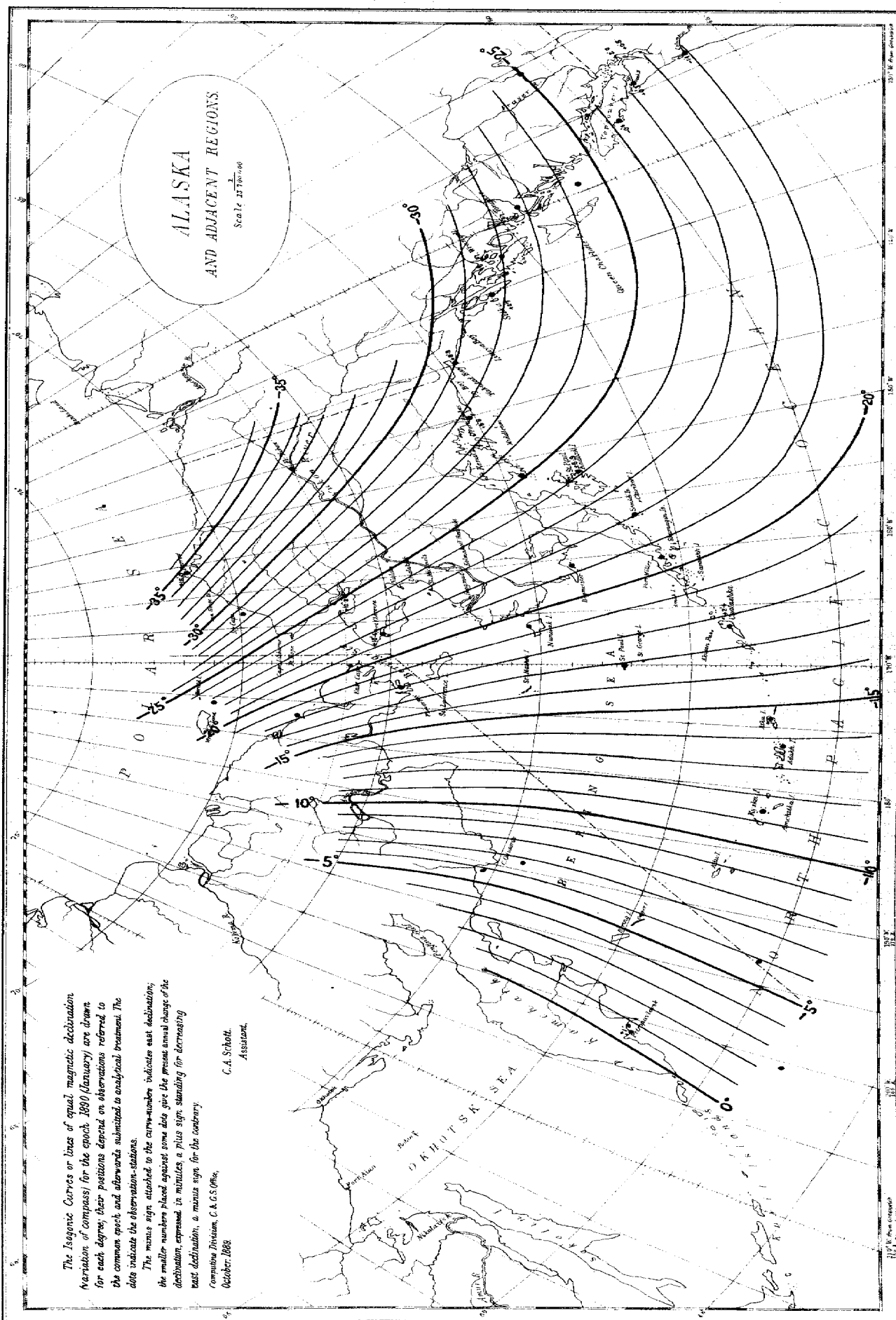
That part of the Pacific Ocean included between the meridians of Yakutat Bay and Middleton Island, and extending about 100 yards off shore, was formerly a favorite resort of the Right Whale fishers, who named it the Fairweather Ground, from the mountain range of the same name. It is in the highest degree improbable that any bank or shoal, at the distance given off shore, and sufficiently near the surface to break in ordinary weather, should have escaped their notice.

There is no doubt but there is some foundation for the many reports of the existence of such a rock or shoal, but it probably lies much nearer the shore than has been reported, and within the 100-fathom line, which here lies nearly parallel with the shore, at a distance off of 35 miles.

On Coast Survey Chart No. 900, published in February, 1890, the position of Pamplona Rock is given as S. 85° E., 44 miles from Cape Suckling, and S. 63° W., 95 miles from Ocean Cape, which is approximately in

Latitude .....	59° 32' N.
Longitude .....	143° 00' W.

U. S. COAST AND GEODETIC SURVEY  
T.C. Mendenhall, Superintendent.  
**ISOGONIC CHART FOR THE EPOCH 1890.**





**TABLE OF**  
**GEOGRAPHICAL POSITIONS IN ALASKA AND ADJACENT REGION,**  
**ALPHABETICALLY ARRANGED.**

The following table contains the geographical positions cited in the preceding text, and for all other localities in Alaska, as determined by the U. S. Navy, the U. S. Revenue Marine, the U. S. Coast and Geodetic Survey, and a few others of importance.

The latitudes are all **N.**, the longitudes all **W.** from Greenwich.

The positions determined by officers of the U. S. Coast and Geodetic Survey are referred to the U. S. Coast and Geodetic Survey; those by officers of the U. S. Navy, to the U. S. Navy, etc.

British Admiralty Charts are referred to by number, as "B. A., 2431," etc. Russian Hydrographic Charts as "R. H.," etc.

## GEOGRAPHICAL POSITIONS.

LOCALITY.	LATITUDE.			LONGITUDE.			DATE.	AUTHORITY.
	°	'	"	°	'	"		
Adakh Island, Bay of Islands.....	51	49	18	176	51	58	1873	U. S. C. & G. S.
Adams, Fort, Tozikakat, Yukon River.....	63	08	11	152	30	11	1869	U. S. A.
Alpha Bay, North Point.....	53	52	01	130	17	34	1879	B. A., 1901.
Althorp, Port. <i>See</i> Granite Cove.								
Amchitka Island, Constantine Harbor.....	51	23	39	180	47	55	1873	U. S. C. & G. S.
Anvik Village, Yukon River.....	62	37	24	160	07	11	1869	U. S. A.
Atka Island, Nazan Bay.....	52	10	30	174	15	18	1873	U. S. C. & G. S.
Attu Island, Chichagof Harbor.....	52	56	01	186	47	36	1873	U. S. C. & G. S.
Bailey Harbor, Alaska Peninsula.....	55	08	48	162	07	22	1879	U. S. R. M.
Barrow, Point, Life-saving Station.....	71	17	42	156	39	45	1882	U. S. A.
Bazan, Port, anchorage.....	54	50	05	132	47	02	1834	Zarembo.
Beaver Cove, Lewis Point, B. C.....	50	32	47	126	52	12	1867	B. A., 2067.
Beaver Harbor, B. C., Shell Islet.....	50	42	36	127	25	07	1862	Vancouver Island Pilot.
Belcher Point, Arctic Coast.....	70	48	00	159	40	22	1880	U. S. C. & G. S.
Belkofski Village, Alaska Peninsula.....	55	05	13	162	00	15	1880	U. S. C. & G. S.
Bering Island Village.....	55	14	00	194	08	00	1879	Nordenskiöld.
Big Bay, B. C., South Island.....	54	59	06	130	28	24	1872	B. A., 1462.
Bingham Point, Yacobi Island.....	58	02	00	136	34	00	1880	U. S. C. & G. S.
Blakeney Port, B. C.....	52	18	47	128	22	42	1872	B. A., 1462.
Bogoslof, Volcano Island.....	53	58	36	168	00	00	1880	U. S. C. & G. S.
Boundary Line, Bering Strait.....	64	45	00	168	58	05	1880	U. S. C. & G. S.
Broad Cape, Kadiak Island.....	57	34	36	152	05	00	1869	U. S. C. & G. S.
Caution Cape, B. C.....	51	09	36	127	48	12	1872	B. A., 2448.
Chamisso Island, beacon, center of island.....	66	13	17	161	50	14	1880	U. S. C. & G. S.
Chernofski Village, Unalaska.....	53	23	57	167	29	56	1880	U. S. C. & G. S.
Chiachi Island.....	55	51	58	159	05	26	1874	U. S. C. & G. S.
Chichagof Harbor <i>See</i> Attu.								
Chignik Bay, Alaska Peninsula.....	56	19	20	158	24	25	1874	U. S. C. & G. S.
Chirikof Island.....	55	48	22	155	42	51	1874	U. S. C. & G. S.

LOCALITY.	LATITUDE.			LONGITUDE.			DATE.	AUTHORITY.
	°	'	"	°	'	"		
Clarence Port, Point Spencer-----	65	17	00	166	50	54	1880	U. S. C. & G. S.
Cloak Bay, Queen Charlotte Islands, entrance--	54	12	00	132	58	00	1880	Dawson.
Coal Harbor, Unga Island-----	55	20	45	160	38	39	1872	U. S. C. & G. S.
Coal Point, Kachekmak Bay-----	59	36	08	151	23	37	1880	U. S. C. & G. S.
Constantine Harbor. <i>See</i> Amchitka.								
Cook Mount-----	60	15	00	140	00	00	1874	U. S. C. & G. S.
Cornwallis Point-----	54	41	40	132	49	00	1874	U. S. C. & G. S.
Couverden Point-----	58	11	15	135	03	00	1890	U. S. C. & G. S.
Crillon, Mount-----	58	40	00	137	02	07	1874	U. S. C. & G. S.
Decision, Cape-----	56	00	08	134	07	31	1886	U. S. C. & G. S.
Diomedé Island, Big, Bering Strait-----	65	44	51	169	04	25	1880	U. S. C. & G. S.
Dolgoi Cape, Dolgoi Island-----	55	03	21	161	43	19	1880	U. S. C. & G. S.
Edward, Cape-----	57	39	00	136	15	00	-----	Various au- thorities.
Ellis Point, Tebienkof Bay-----	56	31	00	134	14	00	1793	Vancouver.
Esington, Port, B. C-----	54	09	00	129	57	00	1881	Geol. Survey of Canada.
Etches, Port, Prince William Sound-----	60	20	43	146	37	38	1874	U. S. C. & G. S.
Etolin, Cape, Nunivak Island-----	60	25	22	166	08	28	1874	U. S. C. & G. S.
Fairweather, Cape-----	58	50	00	137	55	00	1874	U. S. C. & G. S.
Fanshaw, Cape-----	57	11	00	133	34	00	1888	U. S. C. & G. S.
Forrester Island, SE. end-----	54	48	00	133	30	00	-----	Various au- thorities.
Fox, Cape, Dixon Entrance-----	54	45	46	130	50	20	1883	U. S. C. & G. S.
Frigate Bay, Center Islet-----	51	28	10	127	44	38	1879	B. A., 1901.
Fritz Cove, Douglass Island-----	58	20	00	134	36	00	1890	U. S. C. & G. S.
Georgiana, Cape-----	57	18	00	135	45	00	1833	Vasilief.
Graham, Port, Dangerous Cape-----	59	23	53	151	53	00	1880	U. S. C. & G. S.
Granite Cove, Port Althorp-----	58	11	32	136	23	30	1880	U. S. C. & G. S.
Grenville, Cape, Kadiak-----	56	36	47	152	07	00	1869	U. S. C. & G. S.
Guard Island-----	55	26	50	131	52	38	1885	U. S. C. & G. S.
Gustavus Point-----	58	23	00	135	54	00	1870	U. S. N.

## GEOGRAPHICAL POSITIONS.

LOCALITY.	LATITUDE.			LONGITUDE.			DATE.	AUTHORITY.
	°	'	"	°	'	"		
Hagemeister Island, Bering Sea .....	58	48	31	160	50	03	1874	U. S. C. & G. S.
Halibut Bay, Portland Canal .....	55	13	13	136	04	30	1888	U. S. C. & G. S.
Hamilton Harbor .....	56	52	48	133	36	00	1868	U. S. N.
Harris Point, Kuiu Island .....	54	17	42	134	14	00	1848	R. H., 1494.
Hastings Arm, Head of, B. C. ....	55	32	00	129	44	00	1793	Vancouver.
Hastings Arm, Head of, B. C. ....	55	39	00	129	48	00	1868	Pender.
Haystack Island, Tongass Passage .....	54	43	02	130	36	32	1886	U. S. C. & G. S.
Holmes Bay, B. C. ....	53	16	25	129	05	19	1879	B. A., 1901.
Howkan Village, Kaigahnee Strait .....	54	49	30	132	50	12	1881	U. S. N.
Icy Cape, Arctic Coast .....	70	20	00	161	56	00	1880	U. S. C. & G. S.
Icy Cape, Station near .....	70	13	10	162	15	12	1880	U. S. C. & G. S.
Ilina Bay, Anchorage .....	57	47	06	136	16	00	1809	Ilin.
Invisible Point, Dixon Entrance .....	54	10	30	131	37	30	1880	Dawson.
Islands, Bay of. <i>See</i> Adakh.								
Kadiak, Chagafka Cove, St. Paul Harbor ..	57	47	57	152	21	21	1867	U. S. C. & G. S.
Kaigahnee Harbor, Prisoners Cove .....	56	46	00	132	45	30	1849	Etolin
Klemtoo Passage, Observation Islet .....	52	34	22	128	32	09	1872	B. A., 1462.
Knox, Cape, Queen Charlotte Islands .....	54	10	48	132	58	00	1880	Dawson.
Kohklux, Chilkat River .....	59	23	41	135	53	30	1869	U. S. C. & G. S.
Kootznahoo, Danger Point .....	57	28	00	134	37	00	1869	U. S. C. & G. S.
Krusenstern, Cape, Kotzebue Sound .....	67	08	00	163	58	18	1880	U. S. C. & G. S.
Kyunmpt Harbor, Berry Point .....	52	12	20	128	11	37	1879	B. A., 1901.
Kyska Harbor, Aleutian Islands .....	51	59	04	182	30	00	1873	U. S. C. & G. S.
La Perouse Mount .....	58	34	00	137	00	00	1874	U. S. C. & G. S.
Lindenberg Harbor, East Point .....	59	29	00	135	02	00	1869	U. S. C. & G. S.
Lisburne Cape, Arctic Coast .....	68	52	52	166	05	31	1880	U. S. C. & G. S.
Lisburne, end of the cape itself .....	68	53	00	166	10	00	1880	U. S. C. & G. S.
Lituya Bay .....	58	36	57	137	40	05	1874	U. S. C. & G. S.
Marsden Point, Chatham Strait .....	58	03	18	134	48	00	1890	U. S. C. & G. S.

## GEOGRAPHICAL POSITIONS.

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LOCALITY.	LATITUDE.			LONGITUDE.			DATE.	AUTHORITY.
	°	'	"	°	'	"		
Mary, Port -----	57	07	00	135	40	00	1810	Rikord.
McLaughlin Bay, B. C.-----	52	08	37	128	10	18	1879	B. A., 1901.
Metlakatla Bay, B. C.-----	54	20	10	130	27	30	1880	B. A., 364.
Middleton Island -----	59	27	22	146	18	45	1874	U. S. C. & G. S.
Möller, Port, Alaska Peninsula -----	55	54	59	160	34	55	1874	U. S. C. & G. S.
Morris Bay -----	52	21	00	128	28	30	1872	B. A., 1462.
Mosman Island, B. C.-----	51	24	30	127	55	53	1872	B. A., 2448.
Mudge, Cape, Discovery Passage, B. C.-----	50	00	00	125	12	30	1880	B. A., 580.
Mulgrave, Port, Yakutat-----	59	33	42	139	45	53	1874	U. S. C. & G. S.
Muzon Cape, Dixon Entrance -----	54	40	26	132	40	35	1885	U. S. C. & G. S.
Nass Bay, Kincolith Mission -----	54	59	26	129	57	36	1872	B. A., 2190.
Nass River, near village -----	55	03	54	129	31	54	1872	B. A., 2190.
Nabannah Bay, B. C.-----	53	39	24	129	44	51	1872	B. A., 2189.
Napean Point -----	57	08	20	134	16	15	1889	U. S. C. & G. S.
Nazan Bay. <i>See</i> Atka Island.								
New Eddystone Rock, Behm Canal -----	55	29	00	130	45	00	1793	Vancouver.
Nimpkish River, Green Islet, B. C.-----	50	34	12	126	58	37	1867	B. A., 2067.
Northeast Harbor, Little Koniushi Island--	54	58	25	159	22	18	1872	U. S. C. & G. S.
North Point, Dixon Entrance -----	54	15	00	132	56	30	1880	Dawson.
Northwest Harbor, Little Koniushi Island--	55	03	17	159	23	32	1880	U. S. C. & G. S.
Nuchek. <i>See</i> Etches, Port.								
Nulato, Yukon River -----	64	40	23	158	13	00	1869	U. S. A.
Nunez Point -----	54	40	55	132	05	05	1885	U. S. C. & G. S.
Nunivak. <i>See</i> Etolin, Cape.								
Ochek. <i>See</i> Middleton Island.								
Oceau Cape, Yakutat -----	59	30	00	139	54	00	1874	U. S. C. & G. S.
Ommaney Cape-----	56	11	01	134	40	09	1886	U. S. C. & G. S.
Pamplona Bank -----	59	35	00	143	00	00	1779	Artcaga.
Pamplona Bank -----	59	07	00	142	41	00	1802	Galiano.

## GEOGRAPHICAL POSITIONS.

LOCALITY.	LATITUDE.			LONGITUDE.			DATE.	AUTHORITY.
	°	'	"	°	'	"		
Pamplona Bank .....	59	02	00	141	52	00	1794	Vancouver.
Pitlekai, Eastern Siberia .....	67	04	42	173	30	15	1878	Nordenskiöld.
Pikmiktalik River, Norton Sound .....	63	13	41	162	26	00	1869	U. S. A.
Plover Bay, Eastern Siberia .....	64	22	00	173	21	32	1880	U. S. C. & G. S.
Popof Strait, Shumagins .....	55	19	17	160	30	58	1880	U. S. C. & G. S.
Portland Canal, Head of .....	55	55	43	129	59	17	1888	U. S. C. & G. S.
Pyramid Island, Chilkat Inlet .....	59	11	36	135	26	46	1890	U. S. C. & G. S.
Rodgers Harbor, Wrangel Land .....	70	57	00	178	10	00	1881	U. S. N.
Rose. See Middleton and Invisible.								
Safety Cove .....	51	31	49	127	56	23	1879	B. A., 1901.
Saint Albans, Point .....	56	04	57	133	57	40	1886	U. S. C. & G. S.
Saint Elias, Mount .....	60	20	45	141	00	12	1874	U. S. C. & G. S.
Saint George Island, Pribilof, southwest landing place.	56	34	23	169	39	50	1874	U. S. C. & G. S.
Saint Mathew Island, Upright Cape .....	60	17	30	172	14	06	1880	U. S. C. & G. S.
Saint Michael's, Norton Sound .....	63	28	17	162	04	45	1879	U. S. N.
Saint Michael's, Norton Sound .....	63	29	50	162	05	45	1879	U. S. R. M.
Saint Michael's, Norton Sound .....	63	28	00	161	52	28	1869	U. S. A.
Saint Paul Island, Pribilof Group .....	57	07	19	170	19	00	1880	U. S. C. & G. S.
Saint Paul, Kadiak. See Kadiak.								
Sanborn Harbor, Nagai Island .....	55	07	36	159	56	06	1872	U. S. C. & G. S.
Sannak Island, Peak of .....	54	25	50	162	44	00	1874	U. S. C. & G. S.
Semidi Islands, Anowik Island .....	56	05	13	156	39	20	1874	U. S. C. & G. S.
Senati's Village, Yukon River .....	65	20	54	151	10	00	1869	U. S. A.
Shushartie Bay, Halstead Islet .....	50	51	22	127	51	20	1867	B. A., 2067.
Simeonof Harbor, Shumagins .....	54	55	30	159	15	03	1872	U. S. C. & G. S.
Simpson, Port, British Columbia .....	54	33	28	130	25	30	1881	U. S. C. & G. S.
Sitka, Parade Ground Station .....	57	02	52	135	19	45	1867	U. S. C. & G. S.
Sitka, Japonski Island Station .....	57	02	53	135	20	20	1880	U. S. C. & G. S.
Spencer, Cape, Cross Sound .....	58	10	30	136	40	00	1880	U. S. C. & G. S.

## GEOGRAPHICAL POSITIONS.

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LOCALITY.	LATITUDE.			LONGITUDE.			DATE.	AUTHORITY.
	°	'	"	°	'	"		
Symonds Bay, Sitka Sound -----	56	52	50	135	28	10	1880	U. S. N.
Stuart Anchorage, Pitt Island, B. C. -----	53	52	05	130	05	11	1879	B. A., 1901.
Suquash Anchorage, B. C. -----	50	38	30	127	14	42	1872	B. A., 581.
Tamgas Harbor, Gravina Island, at entrance -----	55	03	41	131	31	53	1883	U. S. C. & G. S.
Tongass, Port, Southeast Alaska -----	54	45	59	130	43	44	1869	U. S. C. & G. S.
Uglamie. <i>See</i> Point Barrow.								
Ugolnoi. <i>See</i> Coal Point.								
Ukamok. <i>See</i> Chirikof Island.								
Unalaska Island. Ulakhta Spit -----	53	53	57	166	30	21	1867	U. S. C. & G. S.
Unalaska Island, Iliuliuk Harbor -----	53	52	54	166	31	44	1874	U. S. C. & G. S.
Unalaska Island, Priest Rock -----	54	00	37	166	22	04	1873	U. S. C. & G. S.
Urey, Point -----	57	52	30	172	14	06	1880	U. S. C. & G. S.
Vancouver Mount -----	60	13	42	139	43	00	1874	U. S. C. & G. S.
Wachusett Cove, Bluff Point -----	57	50	00	135	02	00	1881	U. S. N.
Ward Cove, Peninsula Point -----	55	23	02	131	43	57	1882	U. S. C. & G. S.
Whirlwind Bay, B. C. -----	51	51	44	127	52	23	1879	B. A., 1901.
Whitewater Bay, Flag Point -----	57	13	00	134	30	00	1869	U. S. N.
Wrangel, Port -----	56	28	15	132	22	47	1869	U. S. C. S.
Wrangel, Port, North Base -----	56	27	16	132	22	47	1886	U. S. C. & G. S.
Wrangel Strait, Astronomical Station -----	56	40	33	132	55	34	1886	U. S. C. & G. S.
Yukon, Fort, Yukon River -----	66	33	47	145	17	47	1869	U. S. A.





## METEOROLOGICAL TABLES.

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The tables which follow are copied from the tables in the Alaska Coast Pilot of 1883, pages 269, 271, 273.

### SYNOPTICAL TABLES.

**A.**—Temperature of the air.

**B.**—Precipitation.

**C.**—Direction of winds.



TABLE OF TEMPERATURE OF AIR.

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## A.—MEAN TEMPERATURE OF THE AIR.

Place.	JAN.	FEB.	MARCH.	APRIL.	MAY.	JUNE.	JULY.	AUGUST.	SEPT.	OCT.	NOV.	DEC.	Spring.	Summer.	Autumn.	Winter.	Year.
Alan, Okhotsk Sea.....	-5.1	2.0	12.5	24.4	34.3	45.4	53.7	53.9	46.5	28.7	10.3	-3.3	23.7	51.0	28.5	-2.1	25.3
Ala River, E. Siberia.....	-10.5	-27.9	-1.7	5.0	33.7	43.7	51.6	50.3	47.8	41.1	-7.6	-21.6	12.3	47.1	41.4	-20.0	12.7
Anadyr River, E. Siberia.....	31.2	32.0	29.0	36.7	39.9	43.8	49.0	51.6	47.8	41.1	35.5	33.9	35.1	50.9	41.4	32.3	39.9
Atka Island, Aleutians.....	25.5	28.7	25.2	28.6	39.7	42.7	48.2	54.1	50.5	38.8	28.7	27.0	31.2	48.3	39.3	27.1	36.5
Bering Island.....	3.8	8.8	18.0	30.8	42.4	52.0	60.3	61.6	53.1	40.5	21.1	7.9	30.4	58.0	38.2	6.8	33.4
Dud Light house, Sakhalin Island.....	21.6	1.9	22.8	30.5	42.3	54.2	55.0	57.5	50.8	43.7	29.7	3.9	34.9	55.6	41.4	9.1	35.2
Fort Alexander, Nushagak River.....	-22.3	-16.7	-5.4	12.3	35.1	48.0	52.1	51.1	41.0	22.5	-0.1	-10.7	14.0	50.4	21.1	-16.6	17.2
Fort Franklin, H. B. Territory.....	33.9	36.2	38.5	44.8	50.3	56.4	59.6	60.2	53.1	48.8	41.0	38.1	44.5	58.1	47.6	36.1	46.5
Fort Kenai, Cook's Inlet.....	22.6	30.1	30.3	42.2	48.7	56.7	58.6	57.0	52.1	46.1	30.7	32.2	40.4	57.1	43.0	28.3	42.2
Fort Wrangel, Alaska.....	-26.8	-26.4	-11.2	12.7	41.2	53.5	65.7	63.1	38.7	21.6	-8.3	-18.4	14.6	56.7	17.4	-23.8	16.8
Fort Yukon, Yukon River.....	27.0	29.4	35.8	44.6	52.5	59.7	67.2	71.9	65.3	53.4	42.9	32.1	44.3	66.2	53.8	29.5	48.5
Hakodadi.....	-1.7	-5.3	2.1	23.5	33.6	48.9	51.2	48.3	43.4	27.4	12.9	5.7	19.7	49.5	27.9	0.9	24.5
Hazelton, Skeena River, B. C.....	30.0	31.5	29.9	33.3	38.7	44.9	49.1	51.9	46.9	38.8	33.8	30.9	34.0	48.6	39.8	30.8	38.3
Ikogmut, Yukon River.....	-0.4	-15.5	-6.0	14.5	30.0	38.8	50.0	44.5	40.6	25.0	1.1	5.2	12.8	44.4	22.2	-7.4	18.0
Ilialuk, Unalakleet.....	13.0	12.8	21.4	35.9	45.0	50.0	58.5	65.8	53.8	44.7	32.3	21.8	34.1	58.1	43.6	15.9	37.9
Kaimakof Redoubt, Kuskokwim R.....	25.9	17.8	27.3	31.9	41.4	47.7	55.1	60.3	55.5	44.9	30.6	14.0	30.7	54.4	43.7	10.3	34.8
Kuanai, Sakhalin Island.....	6.9	10.1	19.1	31.7	41.4	57.6	62.8	61.2	57.9	49.1	40.3	34.5	35.7	47.4	61.5	49.1	48.4
Möller Islands, Alaska Peninsula.....	34.2	38.5	43.5	46.4	52.2	57.6	62.1	60.8	50.2	34.7	13.8	-5.8	24.1	59.1	32.9	-7.8	27.1
Muraviev, Sakhalin Island.....	-11.4	-6.2	7.5	26.1	38.7	54.5	62.1	60.8	50.2	30.9	34.4	31.5	30.4	59.1	32.9	25.3	27.1
New Westminster, B. C.....	22.4	22.0	33.5	45.3	53.3	66.9	66.2	60.0	60.0	30.9	34.4	31.5	30.4	59.1	32.9	25.3	27.1
Nikolaisk, Amur River.....	-17.7	-7.8	18.9	27.1	45.3	66.9	66.2	60.0	60.0	30.9	34.4	31.5	30.4	59.1	32.9	25.3	27.1
North Foreland, Cook's Inlet.....	-10.7	-6.9	7.3	21.9	36.1	46.2	55.2	55.9	46.6	26.2	5.7	-9.2	21.8	52.4	20.2	-8.9	22.8
Nulato, Yukon River.....	16.9	14.0	23.4	30.4	39.9	50.5	58.3	58.6	51.1	40.1	29.3	20.8	31.2	55.9	40.3	17.2	36.1
Okhotsk, E. Siberia.....	-14.1	-14.6	-6.9	-2.0	19.8	30.9	36.9	38.4	25.9	2.2	-6.7	-9.0	3.6	36.4	5.2	-19.6	5.5
Petropavlovsk, Kamchatka.....	-18.7	-24.0	-12.1	1.6	20.5	32.9	38.7	38.4	25.9	2.2	-6.7	-9.0	3.6	36.4	5.2	-19.6	5.5
Pitktai, E. Siberia.....	-11.2	0.7	4.5	11.5	32.7	40.4	49.8	45.7	40.7	22.6	0.7	0.3	16.2	45.9	21.3	-3.4	19.8
Point Barrow, Alaska.....	20.4	23.8	23.8	35.7	41.4	49.6	55.4	51.8	48.9	37.6	29.3	23.2	33.6	52.3	38.6	22.5	36.7
Port Clarence, Alaska.....	40.6	40.7	42.2	51.6	56.5	65.6	69.5	68.1	63.0	53.2	48.4	39.3	50.1	67.7	54.8	40.2	53.2
Port Graham, Cook's Inlet.....	-20.5	-16.0	-6.2	21.5	29.5	38.0	44.4	42.8	37.5	25.5	17.5	3.7	14.9	41.7	26.8	-10.9	18.1
Portland, Oregon.....	29.8	35.2	38.1	45.3	53.3	63.5	67.8	61.3	49.3	19.2	8.8	-13.3	28.1	59.4	26.7	-9.0	30.8
Port Providence, E. Siberia.....	0.2	4.2	7.5	19.9	34.3	46.1	54.7	53.4	45.5	32.4	14.7	6.1	20.6	51.4	30.9	3.5	26.6
Port Simpson, B. C.....	28.5	25.7	24.2	34.9	41.5	46.4	54.8	56.0	50.4	42.5	35.4	29.4	29.9	45.4	39.6	27.9	36.7
Queen Charlotte Islands, B. C.....	30.0	30.9	33.2	38.0	43.6	50.5	54.8	56.0	50.4	42.5	35.4	29.4	29.9	45.4	39.6	27.9	36.7
St. Michael's, Norton Sound.....	31.4	32.9	35.7	40.8	47.0	52.4	55.5	55.9	51.5	44.9	38.1	33.3	41.2	54.6	41.9	32.5	43.3
St. Paul Island, Bering Sea.....	-9.4	-4.2	16.1	28.9	39.4	56.7	61.3	60.3	49.3	19.2	8.8	-13.3	28.1	59.4	26.7	-9.0	30.8
St. Paul, Kadiak Island.....	-10.2	-4.2	16.1	28.9	39.4	56.7	61.3	60.3	49.3	19.2	8.8	-13.3	28.1	59.4	26.7	-9.0	30.8
Sitka, E. Siberia.....	-10.2	-4.2	16.1	28.9	39.4	56.7	61.3	60.3	49.3	19.2	8.8	-13.3	28.1	59.4	26.7	-9.0	30.8
Unalakleet, Norton Sound.....	-10.2	-4.2	16.1	28.9	39.4	56.7	61.3	60.3	49.3	19.2	8.8	-13.3	28.1	59.4	26.7	-9.0	30.8



TABLE OF WINDS.

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## C.—APPROXIMATE PREVAILING DIRECTIONS OF WINDS.

LOCALITY.	JAN.	FEB.	MARCH.	APRIL.	MAY.	JUNE.	JULY.	AUG.	SEPT.	OCT.	NOV.	DEC.	Spring.	Summer.	Autumn.	Winter.	Year.
Alai, Okhotsk Sea	SW.	NE.	NE.	NE.	NE.	NE.	NE.	NE.	NE.	NE.	NE.	{NE. & SW.}	NE.	NE.	NE.	{NE. & SW.}	NE.
Anadyr River, E. Siberia	SW.	NW.	NW.	NW.	W NW.	SE.	W.	W.	W.	W.	WNW.	NW.	NW.	W.	N.	S.	S.
Atka Island, Aleutians	S.	S.	N.	S.	S.	S.	S.	W.	S.	N.	N.	NW.	S.	W.	SSW.	N.	N. & S.
Attn Island, Aleutians	N.	N.	N.	N.	S.	S.	S.	W.	SW.	S.	NW.	N.	S.	S.	S.	N.	N. & S.
Dud Lighthouse, Sakhalin																	
Fort Kenai, Cook's Inlet																	
Fort Tongass, Alaska	NE.	E.	E.	SSE.	S.	S.	SSE.	S.	S.	SE.	E.	E.	SE.	S.	SSE.	NE.	SSE.
Fort Wrangel, Alaska	E NE.	NE.	E NE.	SE.	E.	W NW.	W.	W.	ESE.	NE.	NE.	NE.	E.	W.	NE.	NE.	Var.
Ikogmut, Yukon River	NE.	N.	NE.	N.	E NE.	SW.	NE.	SSW.	E NE.	E.	NE.	E.	NE.	SW.	NE.	NE.	NE.
Ilinik, Unalak	N.	SW.	S.	SW.	{NNW. & var.}	SSW.	SW.	W SW.	W.	W.	W.	W NW.	SW.?	SW.	W.	N.	SW.
Knessai, Sakhalin Island	E.	E SE.	E SE.	SE.	E.	E.	E.	E.	E.	E.	E.	W.	ESE.	E.	E.	E. & W.	E.
Muraviet, Sakhalin Island	E.	SW.	SW.	SW.	SW.	SW.	E NE.	E.	E NE.	W.	W.	W NW.	SW.	E.	NNW.	Var.	SW.
Nikolaiefak, Amur River	W.	W.	W.	W. & E.	E.	SE.	SE.	SE.	E. & W.	W.	W.	W.	W. & E.	SE.	W.	W.	W. & E.
North Foreland, Cook's Inlet	N.	N.	NE.	N.	N.	N.	N.	N.	N.	N.	NE.	NE.	N.	N.	N.	NE.	N.
Nulato, Yukon River	SW.	N.	{NW. & NE.}	N NE.	NNW.							E. & W.	N.			Var.	
Okhotsk, E. Siberia	N.	N.	N.	N.	SE.	SE.	SE.	SE.	N.	N.	N.	N.	N.	SE.	N.	N.	N.
Petropavlovsk, Kamohatka	N.	N.	N.	NW.	NW.	{NW. & S.}	NW.	NW.	NW.	NW.	NW.	NE.	NW.	NW.	NW.	NNW.	NW.
Pilekai, E. Siberia	N.	NNW.	N.	NNW.	NNW.	SSW.	SSW.		NNW.	NNW.	NNW.	N.	NW.			N.	
Port Simpson, B. C.	N.	N.	N.	N.	N.	S SW.	S SW.				SE.	N.	NW.			N.	
Queen Charlotte Islands																	
St. Michael's Norton Sound	S.	NE.	N.	NE.	NNW.	SW.	SW.	SE.	NNW.	NE.	NE.	NE.	N.	SW.	NE.	NE.	N NE.
St. Paul Island, Bering Sea	E.	S. & E.	W.	N. & E.	N. & E.	S. & W.	S.	S. & E.	NNW.	NW.	Var.	S.	N.	Var.	W.	S.	Var.
St. Paul Kadisk Island	N NE.	NNW.	{NE. & SW.}	NE.	NE.	E.	SW.	ESE.	NE.	N.	NW.	NW.	NE.	ESE.	NW.	N.	Var.
Sitka	E NE.	E.	E.	Var.	W.	W.	SW.	SW.	S.	E.	E.	E.	Var.	SW.	E.	E.	S. & E.



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